

ROYAL BOTANIC GARDENS, KEW.

# BULLETIN

OF

## MISCELLANEOUS INFORMATION.

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### XXIII.—A NEW GROUND BEAN.

(*Kerstingiella geocarpa*, Harms.)

WITH A NOTE ON THE DISCOVERY OF VOANDZEIA  
SUBTERRANEA IN THE WILD STATE,

O. STAFF.

Three years ago Professor H. Harms\* described a new genus of *Leguminosae* which he called *Kerstingiella* after its discoverer, Dr. Kersting of Sokodé, Togoland. Apart from the strictly botanical interest attaching to it, it was remarkable as the source of a ground bean or nut which had been until then unnoticed, although its cultivation in Upper Guinea as we now know extends over a fairly large area. In 1910 Dr. A. Chevalier† recorded the same plant from Dahomey, describing it as a new species of *Voandzeia* under the name *V. Poissonii*. Since then it has been in cultivation and under observation in the Botanic Gardens at Dahlem and Jena, and last year Professor Harms‡ published a short article in which he summarised briefly what was then known about this ground bean, adding some valuable information concerning the conditions of its cultivation.

Chevalier§ states that Hausa traders assured him of the existence of the bean in British Nigeria. This statement is confirmed by specimens of *Kerstingiella* communicated to Kew by Mr. W. R. Elliot, who came across it as a field crop in Nupe. The plant is undoubtedly of some economic importance and it seems desirable to call the attention of British residents and travellers in Nigeria to the occurrence of this ground bean in order to ascertain its distribution in that colony and to gather further information about its cultivation and economic uses, and also, if possible, to discover it in the wild state in which it has not so far been observed.

\* Harms in *Berichte d. Deutsch. Bot. Gesellschaft*, vol. xxvi., a, p. 230, tab. iii.

† A. Chevalier in *Compt. Rend.*, vol. cli., p. 84.

‡ Harms in *Deutsche Kolonialzeitung*, vol. xxviii., p. 160; reprinted in *Tropenpfl.*, vol. xv., p. 273.

§ Chevalier in *Compt. Rend.*, vol. cli., p. 1374.

The purpose thus outlined will be best served by a translation of Professor Harms' summary mentioned above with a description of the plant and some observations on its morphological and biological peculiarities mainly quoted from the same author's earlier paper together with a list of vernacular names.

#### DISTRIBUTION.

"Two years ago I called attention to an important botanical discovery by Dr. Kersting, who, in the northern territory of Sokode-Basari, Togoland, came across an especially interesting new kind of bean which matured its pods below, instead of above ground. The well-known ground nut (*Arachis hypogaea*), and the peanut (*Voandzeia subterranea*), are similar instances. Kersting found that the natives of Togoland cultivated the bean, which they called Kandela in three varieties distinguished by their colours. I described this bean which is not known in the wild state, as *Kerstingiella geocarpa*, the type of a new genus of *Leguminosae*.

"In July, 1910, Aug. Chevalier, the indefatigable African explorer, reported the existence in Dahomey of a plant which, to judge from the description, was very similar to, if not identical with, Kersting's bean. He named it *Voandzeia Poissoni*, a new species of the genus of the peanuts, giving the Dahomey name as 'Doi.' The beans are sold in the market of Abomey by the natives, who grow them largely. There were also here colour varieties (white, black† and mottled). An account may be found in *Quinzaine Coloniale*, 1910, No. 16, p. 590. Chevalier's description suggested at once the identity of the Dahomey and the Togo bean. M. Chevalier was, on his return from Africa, good enough to send me a specimen of his Dahomey plant whilst I supplied him with material from Togoland and our comparisons proved that the two beans were actually identical, or in other words that the Togo bean extended into Dahomey and M. Chevalier has already stated (*Compt. Rend. l.c.*, p. 1374) that he too considers his species as identical with *Kerstingiella geocarpa*. He gives an important account of its distribution in Dahomey, quoting various vernacular names. The species is also said to occur in British Nigeria, but up to the present I have seen no specimen from there. In Togo as well as in Dahomey the plant is known only in the cultivated state, which renders Kersting's and Chevalier's discoveries the more remarkable.

"Chevalier gives analyses (*l.c.* 1375) which show that the nutritious value of the beans is very considerable. They are said to equal the richest peanuts in nitrogenous matter, whilst they have at the same time a more pleasant taste, particularly for Europeans, recalling that of the finest varieties of beans. The yield, owing to the smallness of the seeds (8-10 cm. by 6-7 mm.), is not large. In Dahomey according to the French explorer, the women are forbidden to eat the beans.

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\* On the distribution of *Kerstingiella geocarpa* in tropical Africa (by Harms in *Deutsche Kolonialzeitung*, vol. xxviii., p. 160).

† Or red (Chevalier *l.c.*, p. 86).



"Last year (1910), thanks to the kindness of First Lieutenant Häring of Sokodé-Basari (Togo), the Botanic Garden at Dahlem near Berlin received excellent seeds of this remarkable fruit. They germinated well and numerous plants were raised by Chief-Inspector F. Ledien, not a few of them flowering in July and August. A number of seeds were sent to Inspector E. Rettig of the Botanic Garden at Jena, and under his careful and intelligent treatment, splendid specimens grew up of which some even set fruit. The unfavourable cold and dull summer of 1910, however, prevented their maturation. The flowers are very small and papilionaceous and spring from the creeping stem close to the ground. The flowers of the variety with light or occasionally black-mottled seeds are white, those of the other varieties pale violet.

"It is desirable to follow up the distribution of this cultivation, particularly among the natives in Togo, where it may also be found in the wild state. Similarly *Voandzeia subterranea*, so generally cultivated in Togo, has never been observed in the spontaneous condition. It is also possible that *Kerstingiella* occurs in the Hinterland of the Cameroons (Adamaua, Zola, Garua, &c.). Chevalier states that the Hausa traders contended that it existed in British Nigeria, and the probability that the Hausa people were instrumental in the spreading of the cultivation is obvious. The Hausas call it Kouarourou according to Chevalier. It is also said to occur in Borgu. It is true, at the first glance it might be mistaken for *Voandzeia subterranea* and Schweinfurth actually suggests that this has been the case with certain writers (*Zeitschrift d. Gesellschaft f. Erdkunde*, 1910), but the expert will always distinguish them. Habit and leaves are similar and yet distinct, and *Voandzeia*, so long and so well known to us, has above all much larger globose seeds.

"In any case, I should be very grateful for any communications concerning *Kerstingiella* or *Voandzeia*, their cultivation and use, and particularly if they are accompanied by flowers, fruits and seeds. Material of this kind would enable us to establish the distribution of the plant. *Kerstingiella* might possibly also be grown with advantage in other parts of our colonies. Moist and hot countries do not suit it; in Togo it occurs according to Kersting in sandy laterite loam, in a climate of low humidity with occasional heavy showers and a shade temperature of 18°–34° C."

#### MORPHOLOGY AND BIOLOGY.

As there is only one specimen of *Kerstingiella geocarpa* in the Kew Herbarium—and this only in the fruiting stage—the following description and observations are mainly taken from Harms' paper in the *Berichte der Deutschen Botanischen Gesellschaft*.

A prostrate herb. Taproot with slender branches sometimes bearing nodules. Main stem creeping, 5–8 cm. long, hirsute-pubescent or nearly glabrous, rooting from the nodes, emitting numerous short stolons with approximate nodes and mostly bearing leaves which are reduced to the stipules (Chevalier). Normal leaves 3-foliolate, borne on upright, pubescent petioles, 6–12 or, according to Harms, as much

as 23 cm. long; leaflets petiolulate, broadly ovate or obovate, more or less rounded at the base, obtuse, 5-8 cm. long, 3-5.5 cm. wide, hirsute-pubescent, or finely ciliate when young (Chevalier), finally glabrous; stipules deltoid-ovate 4-6 mm. long, pubescent, striate; stipellae linear. Flowers small, in pairs or, by abortion, solitary in the axils of the leaves, subsessile, with a pair of lanceolate bracteoles at the base. Calyx hirsute-pubescent, with a cupuliform tube and sub-equal linear, acuminate segments, almost twice as long as the tube, the posticous segments united up to or beyond the middle and slightly longer than the lateral. Corolla shortly exerted from the calyx, glabrous, greenish-white excepting the pale violet tip of the standard, 0.8-1 cm. long; standard obovate to suborbicular, emarginate, shortly or obliquely clawed; wings narrow, oblong, obtuse, shortly clawed; keel oblong, obtuse, slightly curved, exceeding the wings, its petals cohering at the middle. Filaments connate with the exception of the posticous one which is free; anthers small, shortly ellipsoid. Disc posticous, short. Ovary shortly stipitate, glabrous or nearly so; style gently curved, laterally somewhat compressed, glabrous; stigma terminal, capitate, finely ciliate; ovules usually 2; stipes after fertilisation lengthening into a carpopodium 1.5-3 cm. long and burying the ripening pod in the ground. Mature pod indehiscent, 1.3-2 cm. long, 0.7-1 cm. wide, usually divided by a constriction (rarely 2), and a corresponding thin septum into 2 (rarely 3) joints, or it may be simple, slightly curved, glabrous; pericarp thin, crustaceous, slightly rugose. Seeds oblong or oblong ovoid, 6-7 mm. long, 5 mm. wide; testa thin, white, red, black or mottled; hilum small, linear-oblong, whitish; radicle lateral, short, conical.

As the resemblance between *Kerstingiella* and *Voandzeia subterranea* (at least in its broad-leaved states), is considerable and the two have actually been confused, it may be useful to point out the following differences.

*Kerstingiella geocarpa.*

*Flowers* subsessile in the axils of the leaves, paired or solitary without a distinct common peduncle.

*Calyx* deeply divided, with narrow, linear, subequal segments.

*Style* glabrous.

*Stigma* terminal, capitate.

*Stipes* of pistil lengthening considerably after fertilisation.

*Seeds* oblong-ellipsoid, 6-7 mm. by 5 mm.

*Voandzeia subterranea.*

*Flowers* usually in pairs on a common, more or less hairy, peduncle terminating with a callous swelling.

*Calyx* with short, broad and unequal teeth.

*Style* hairy on the inner side upwards.

*Stigma* lateral, below the pointed apex of the style.

*Pistil* without a stipes.

*Seeds* globose - ellipsoid, 1-1.5 cm. by 0.9-1.05 cm.

The mechanism by which the pods of *Kerstingiella* become buried in the ground is very singular and almost unique in *Leguminosae*. When the flowers, which seem to be chasmogamous, are fully developed, they are close to the ground. After fertilisation the solid base or stipes of the pistil, which in the flower is very short,



lengthens into a carpopodium and at the same time turns towards the ground; then the corolla and the style are thrown off. The ovary, still very small, is pushed out of the calyx, and by the root-like carpopodium gradually driven into the ground, where finally the growth and the maturation of the ovary into the seed-bearing pod takes place.

#### VERNACULAR NAMES.

Dr. Kersting states that the bean is called "Kandela" in the Sokode-Basari District in Northern Togoland, whilst Chevalier quotes the following names:—Doi and Nadou (Dahomey); Dieguem tenguéré (Mossé), Kouarourou (Hausa), Dougoufalo (Bambara) and Bindi (Baunnako).

The specimen collected by Mr. W. R. Elliot in Nupe bears the name "Pararu."\* This has been referred to *Voandzeia subterranea* by Mr. J. H. Holland in "The Useful Plants of Nigeria" (*Kew Bull.* Add. Ser. ix., part ii., p. 232). Dr. Dalziel's Kwaruru (Holland, l.c.) from Kontagora is evidently the same as Chevalier's Kouarourou, mentioned above.

## II. DISCOVERY OF VOANDZEIA SUBTERRANEA IN THE WILD STATE.

This plant, so widely cultivated in Africa and in other parts of the tropics has up till recently been unknown in the wild state, although everything pointed to the fact that it had its origin in Tropical Africa. The question seems now to be definitely solved by the simultaneous discovery in August, 1909, of the wild form by Dr. Dalziel in the bush in the Kilba country, north of Yola, and close to the frontier of German Adamaua, and by C. Ledermann, near Garua in German Adamaua. The specimens differ in no way from the narrow-leaved states of the cultivated *Voandzeia*, excepting in the more slender character of the stolons, peduncles and pedicels, and the short petiolule of the terminal leaflet. In neither case, however, were fruits collected. Kew is indebted to Dr. H. Harms for a specimen of Ledermann's plant and information about it.

#### EXPLANATION OF PLATE.

The figures have been reproduced from the *Berichte d. Deutschen Botanischen Gesellschaft*, vol. xxvi. a, tab. III., by the kind permission of the secretary and the author:—(1) The plant, with fruits and flowers; (2) a flower; (3) a calyx, laid open; (4) a standard; (5) one of the wings; (6) keel; (7) pistil; (8 and 9) advanced stages of the pistil with enlarged stipes; (10) a pod, not quite mature, cut open; (11) seed, seen from the hilum side; (12) the same in side view; (13) embryo.

All enlarged, excepting 1, 11, and 12 which are natural size.

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\* This is given as the Hausa name of *Voandzeia* by Dudgeon (*The Agric. and Forest Prod. of Brit. West Africa*, p. 152), and a sample of Paruru seeds in the Imperial Institute, collected by Dudgeon, is undoubtedly *Voandzeia subterranea*.

## XXIV.—NOTES ON SOME NEW AND CRITICAL PLANTS FROM EASTERN ASIA.

H. TAKEDA.

During the time that I have been engaged in a study of some Japanese plants in the Kew Herbarium, I have noticed several which have either required critical revision or have been left undescribed. In this short paper only certain plants belonging to six genera are dealt with, which for the sake of convenience are arranged alphabetically.

## ARISAEMA.

Several names have been proposed for the various forms of *Arisaema japonicum* and *A. serratum*. Different views in classification have also been put forward by not a few botanists. These two plants have been known to us from the time, previous to Kaempfer's visit in the year 1690; he saw the former plant and referred to it in his book under the name of '*Nansoo*, &c. . . .'. Thunberg† considered the same plant to be *Arum Dracunculus*, Linn., which is now known as *Dracunculus vulgaris*, Schott. Blume was the first to give a correct name to this plant and called it *Arisaema japonicum*.‡ Thunberg also described§ and figured|| the other plant under the name of *Arum serratum*, the name afterwards altered by Schott¶ into *Arisaema serratum*.

Now the distinguishing characters used by botanists both in Japan and in Europe, were in the first place the serration of the leaf-margin and also the dark purplish colouring of various parts of the plant of *A. serratum*, while in *A. japonicum* the leaf-margin is entire and a greenish colour is prevalent. If it were only so, Engler's reduction\*\* of *A. serratum* to *A. japonicum* as a variety would hold good. These characters, however, are not at all constant, since one comes across a specimen with a green flower (in the broadest sense), the leaf of which has conspicuous serration on the margin, or *vice versa*. After a comparison of a great many specimens obtained from different parts of Japan, Makino came to the conclusion that these two plants are merely forms of one and the same species.†† He adopted the oldest name *serratum*, for the specific name of the plant in question, and called the serrated-leaved form *forma Thunbergii*, and the other *forma Blumei*.

The question seemed to have been settled then, and we followed this view.

In the year 1906, I had an opportunity of collecting a good many specimens of these plants in several places of Central as well as Northern Japan. Examining those specimens, it struck me, that

\* Kaempfer, Amoenit. Exotic., p. 786. (1712).

† Thunb. Fl. Japon., p. 233 (1784).

‡ Blume, in Rumphia, i, p. 106 (1835).

§ Thunb. in Trans. Linn. Soc., ii, p. 338 (1793).

|| Thunb. Ic. Pl. Japon., iv, tab. 7.

¶ Schott, Meletem. Bot., i, p. 17 (1832).

\*\* Engl. in DC. Monogr. Phan. Aroid., p. 549.

†† Makino, in Tôkyô Bot. Mag., xv, pp. 128, 129 (1901).



there exist certain other characters, by which we can distinguish two different plants. Owing to the encouragement I have received from Mr. T. Makino, I continued my investigations and came to the conclusion, that *A. serratum* and *A. japonicum* must be regarded as two distinct species. Recently I was able to examine a number of specimens preserved in the Kew Herbarium, some of which have been referred to by the previous workers. The result of this comparison agreed very well with that of my former study, and seems to me not to be superfluous to publish here. The principal points by which we can distinguish these two species are as follows:—

The central one of the pedately-arranged leaflets:

more or less long-stalked ... .. *A. japonicum*  
generally sessile or shortly stalked ... *A. serratum*

The elongate appendage of the spadix:

slender and sometimes more or less attenuated towards the apex and slightly curved ... .. *A. japonicum*  
stout, clavate, more or less thickened at the apex ... .. *A. serratum*

The tubular part of the spathe:

cylindrical, slightly recurved at the mouth, generally longer than the lamina ... .. *A. japonicum*  
infundibuliform, much recurved at the mouth, generally equal in length to the lamina ... .. *A. serratum*

The characteristics represented by the flower are well marked in living specimens, but are rather obliterated by pressing them. The colour of the flower and of the patches on the stem is but little reliable, since there often occurs an intermediate condition, and also it shows a certain degree of modification every year. The serration on the leaf-margin does not afford a character distinguishing for species or varieties in many species of *Arisaema*. As in these two plants, Engler regards the serration as a principal character distinguishing *A. Sazensoo* from *A. amurense*.<sup>\*</sup> In nature these plants have sometimes entire leaves and sometimes serrated leaves. Whether the serration is constant in a certain form of one species or varies from year to year, I have no record. However, it would not be at all surprising, should one plant produce entire leaves in one year and serrated leaves in the next, since certain species of this genus possess the remarkable character of changing not only the colour but even the sex.

The change of sex is not much known, still I have observed it in *A. japonicum* and in *A. ringens*. As is generally known the great majority of the species of this genus are dioecious, but from a plant bearing female flowers in one year, it may be possible to obtain in the next year a plant bearing male flowers from the same corm. In such a case the plant generally gets smaller and slenderer than it was; and in general, the male plant is smaller than the female. It appears to me, that the question of sex in this genus is determined

<sup>\*</sup> Engl., l.c., p. 550.

by the amount of nutrition which a plant obtains from soil. It sometimes happens that a particularly well developed specimen of a dioecious species may become monoecious, and I have observed such a case in *A. Thunbergii* and in *A. heterophylla*. With regard to these interesting phenomena, further observations and experiments are very much to be desired.

*A. serratum* grows in Central and South-Western Japan, while *A. japonicum* is widely distributed nearly all over the country and also even in China, Corea and in Manchuria. Where these two species occur together, hybridisation seems to take place between them. One sometimes comes across an intermediate form about which it is by no means easy to decide from herbarium material.

In conclusion I may perhaps mention here the nomenclature and also the specimens represented in the Kew Herbarium.

*Arisaema japonicum*.—Blume, in Rumphia, i, 106 (1835). *A. amplissimum*, Bl.; Miq. Prol., p. 134. *A. latisectum*, Bl.; Miq., l.c. *A. japonicum* var. *angustifoliolata*, Miq., l.c., p. 375. *A. japonicum* var. *latisectum*, Miq., l.c. *A. japonicum* var. *latifoliolata*, Schott. *A. serratum* forma *Blumei*, Makino, in Tôkyô Bot. Mag., 1901, p. 129, partim. *A. angustatum*, Fr. et Sav. Enum. Pl. Japon., ii, pp. 3, 507.

JAPAN. Without definite locality, ex Herb. Lugduno-Batav., *J. Small*, 1853; Nagasaki, *Maximowicz*, 1863,\* *Oldham*, n. 818; Tônosawa, *Dickins*, 1881; Shimura, ex Herb. Tôkyô, 1885; Nikkô, *Bisset*, 1221; Hakone, *Challenger Exped.*, 1875; Hakodate, *C. P. Hodgson*, 1860; Fukuyama, *Faurie*, 3813; Nanokawa, *K. Watanabe*, 1896; Chichibu, *K. Watanabe*, 1895; central mountains, *Maries*.

CHINA. Hupeh, *Henry*, 5371; Tientai Mt., prov. Chekiang, *Faber*, 1889. Kew, cult., type of Bot. Mag., 610–2130 m., 7916.

*Arisaema serratum*, *Schott*, in Melet. Bot. i, p. 17 (1832). *Arum serratum*, Thunb. in Trans. Linn. Soc. ii, p. 338 (1793); Ic. Pl. Japon, iv, tab. 7. *Arisaema japonicum* var. *serratum*, Engl., l.c. p. 549. *A. serratum* forma *Thunbergii*, Makino, l.c. p. 128, partim.

JAPAN. Tônosawa: Hakone, *Dickins*, 1881; Chichibu, prov. Musashi, *Watanabe*, 1895.

There is a specimen at Kew collected by *Maximowicz* at Hakodate in the year 1861, and named *Arisaema japonicum*, Bl. var. *atro-purpureum*, Engl., and there is also another specimen of the same plant collected at the same locality by *Hodgson* in the previous year. These two specimens do not really belong to *A. japonicum*, but represent an interesting species called *A. Takedai*, Makino,\* which seems to me to come nearer to *A. serratum* than to *A. japonicum*. I discovered this plant at Nikkô in July 1903, and it is now found to be distributed in Yezo also. The plant is stout, with a thick, more or less fleshy leaf, undulate on the margin; the spathe is very large and deep purple in colour.

Both *Arisaema japonicum* and *A. Takedai* produce bulbils on the corm, while, so far as I am aware, they are absent in *A. serratum*.

As a rule, herbarium specimens do not show this point, so that, at present, I am unable to be precise about this character.

\* Makino, in Tôkyô Bot. Mag., xxiv, p. 73.



## CALAMAGROSTIS.

About a dozen species of this genus were recognised by Hackel as natives of Japan, when he published the "Enumeratio Graminum Japoniae." \* In the year 1910 I added† seven new species to the flora of Japan, and at present twenty species are known to us. Hackel‡ reduced *C. hakonensis*, Fr. et Sav., to *C. sachalinensis*, Fr. Schm., adopting the latter name for this species. Some time ago I had occasion to examine Schmidt's original specimen of *C. sachalinensis*, and compared it with a specimen collected by Mr. Dickins, and named *C. hakonensis*. Although these two plants are so alike, yet there are some marked characters by which the two species may be easily distinguished. From an examination of several specimens, I am led to the conclusion that *C. hakonensis* should be retained as a distinct species.

The chief points of distinction of these two plants are as follows:—

*Calamagrostis sachalinensis*, Fr. Schm., Reis. Amurl. Sachal. p. 202, tab. 8, fig. 8–14.

Dense caespitosa; foliis in sicco plerumque planis, vagina glaberrima, ligula brevī saepe in foliis superioribus brevissima; glumis sterilibus inaequalibus, II<sup>da</sup> brevī, glumam fertilem aequanti vel longiore.

JAPAN. Ganju, *Faurie*, 13,656; Rishiri, *Faurie*, 8424; Rebun, *Faurie*, 8548. Saghalien, Fr. Schmidt.

*Calamagrostis hakonensis*, Fr. et Sav., Enum. Pl. Japon. ii, pp. 168, 599.

Speciei praecedenti valde affinis, sed ab ea foliis in sicco saepius convolutis, basi externe annulo pilorum cinctis, vagina villosula, ligula plerumque producta, glumis sterilibus aequalibus, carina scabra differt.

JAPAN. Ad basin Fuji, *Dickins*, x. 1881; Osorezan, *Faurie*, 4599; Hakodate, *Maximowicz*, 1861; Otaru, *Faurie*, 1362, 2879, et 3088; Mombetsu, *Faurie*, 1002.

When describing *C. variegata*, in my paper, I stated that my plant differs from *C. sachalinensis* in certain points. This is certainly not quite correct, since I mean *C. hakonensis* with *C. sachalinensis*.

When describing my *C. nana*, I was not able to find out any allied species, but last year I found a few specimens at Kew, which are so similar to my plant, that I could not draw any specific distinction between them. In consequence, my plant is to be regarded as follows:—

*Calamagrostis deschampsoides*, Trin., Spec. Gram. Ic. et Desc. iii, sub tab. 354. Ledeb. Fl. Ross. iv, p. 427.

Var. *nana*, *Takeda*.

A planta typica foliorum laminis longioribus vaginas excedentibus, glumis sterilibus paulo inaequalibus, arista breviorē distinguitur.

\* Hackel, in Bull. Herb. Boiss., vii, 1899.

† Takeda, in Tôkyô Bot. Mag., xxiv, No. 277.

‡ Hackel, l.c. p. 650.

JAPAN. Yatsugatake, *T. Yamanaka*, 1906<sup>1</sup>; Higashi-Komagatake, *H. Takeda*, 1906.

The type form is distributed in Kamtschatka, Behring, Baical, and Arctic Russia, while the variety is known at present only from the Alpine region of high mountains of Central Japan.

#### CALTHA.

The following new form of *Caltha palustris* from China has been observed in the Kew Herbarium, a description of which is given below.

*Caltha palustris*, *L. var. sibirica*, *Regel*, Pl. Radd. i, p. 53; subvar. *palmata*, *Takeda*.

*Caulis* adscendens vel erectiusculus, gracilis, elatus, usque 40 cm. altus, uni- vel bifolius. *Folia* crassiuscula, radicalia petiolata, oblongo-ovata vel ovato-orbiculata, lobis basilaribus conniventibus, circumcirca crenato-dentata, caulina ambitu reniformia, basi profunde et aperte cordata, profunde palmato-incisa vel laciniata, lobis argute pauciserratis. *Flores* mediocres, 3-3.5 cm. diam., plus minus longe pedunculati, bracteis ambitu cordato-ovatis, fere palmatilobis, laciniis angustis integris pauciserratisve. *Carpella* 7-10, in stylum brevem attenuata, submatura erecta.

CHINA. Yunnan: Mengtze; mountain marshes, 1980 m., rare, *W. Hancock*, 164; Yunnan, *Fr. Ducloux*, 3294, *Delavay*, 1084.

#### GLAUCIDIUM.

This genus, established by Siebold and Zuccarini,\* was based on specimens collected in Yezo, Japan. As these botanists had but a few specimens with fully opened flowers, they could not give a satisfactory description of the genus, and they doubted whether the whorl of the perianth represented the calyx, the corolla being wanting, or whether the calyx was caducous, and did not remain on the fully opened flowers. The true nature of the perianth was correctly described by Benth and Hooker† and by Baillon.‡ There still remained an error with regard to the arrangement of ovules on the placenta, which was pointed out by Finet and Gagnepain.§ The argument made use of by these French botanists is quite correct, since the ovules are biseriate and not multiseriate on the placenta.

Now, there is only one species of this genus called *G. palmatum*,\* which is found in Yezo as well as on the mountains of Central Japan.

A new species, *G. pinnatum*, from the province of Ssuchuen, China, was added to this monotypic genus by Finet and Gagnepain.|| The figures given by these French authors strongly suggest that the plant in question possesses all the characteristics of a Papaveraceous plant known as *Hylomecon japonicum*, Prantl (syn. *Chelidonium japonicum*, Thunb., *Stylophorum japonicum*, Miq., *Chelidonium*

\* Sieb. et Zucc. *Florae Japon. Fam. Nat.*, n. 185 (1845).

† Benth. et Hook. *Genera*, Pl. i, p. 7.

‡ Baill. *Hist. des Pl.*, i, p. 85 (1867).

§ Finet et Gagn. in *Bull. Soc. Bot. France*, li, p. 391 (1904).

|| Finet et Gagn. l.c., p. 392, tab. iv, fig. A. a-c.



*uniflorum*, S. et Z. and *Hylomecon vernale*, Maxim.), which is distributed throughout the Far East. The only points which contradict my supposition are that this Chinese species has (1) no radical leaf, (2) only four sepals but no petals, and (3) biseriate ovules. The first and second points are most probably due to the imperfections of the specimen which came into the hands of these authors. The description and figures of the ovary given by the French authors are puzzling, since they point to an intermediate character between *Ranunculaceae* and *Papaveraceae*. One unmistakable character of *Papaveraceae*, however, is well represented by the stamen of the plant in question. The filament tapers towards the apex, and does not continue to the connective, as the French authors describe and figure. Another objection against referring the plant to *Glaucidium* is the absence of a bract below the flower.

Anyone who compares the figures of *Glaucidium pinnatum* with those of *Hylomecon japonicum*, published either in the Botanical Magazine, tab. 5830, or in Maximowicz's "Primitae Florae Amurensis," tab. 3, will probably agree with my view, even without dissecting the flower.

Another remarkable species, *G. paradoxum*, was described by Makino.\* This species is distinguished from *G. palmatum* mainly by having four carpels (two of these are said to be abortive), and by some of the stamens being malformed and assuming a carpel-like appearance. This is certainly a peculiar, but not at all a surprising phenomenon amongst *Ranunculaceae*. It is well known that the stamens of various members of this family are often metamorphosed into petaloid forms. It would not therefore be at all surprising should four normal carpels occur in *Glaucidium palmatum*, because this plant, which normally has two carpels slightly connate at the base, has often only a single carpel, and sometimes may have as many as three. As the author suggests, the specimen he examined is evidently a monstrous form of *G. palmatum*, and not a distinct valid species.

Although this pluricarpellar malformation suggests an apparent similarity between this genus and the North American *Hydrastis*, these two genera cannot be united, since the structure of the gynoecium is totally different in the two.

The flower of *G. palmatum* is usually solitary, but in a vigorous plant there sometimes occur two flowers borne at the summit of the stem, and then the bract is common to the two flowers.

A species of *Hydrastis* was recorded from Japan, under the name of *H. jesoensis*, Sieb., a very brief description of which is given by Miquel.† Prantl,‡ usually a careful botanist, accepted this species. Huth§ entertained doubts about it, and suggested that it might be a species of *Glaucidium*, though not *G. palmatum*. Miquel's description of this doubtful plant is very vague, still there one can perceive a characteristic of *Glaucidium* in it, as he says, "... carpellis 2 . . . basi inter se connatis, . . ." This does not occur in *Hydrastis*, but does in *Glaucidium*. I have no doubt that this

\* Makino, in Tōkyō Bot. Mag., xxiv, p. 71 (1910).

† Miquel, Prol. Fl. Japon., p. 369.

‡ Prantl, in Engl. u. Pr. Natürl. Pflanzen-Fam., iii, 2, p. 55.

§ Huth, in Engl. Bot. Jahrb., xvi, pp. 292, 293.

plant is nothing but *Glaucidium palmatum*, a deflorous specimen of which was mistaken by both Siebold and Miquel to be a species of *Hydrastis*.

It would be very inconvenient to a student of botany should such plants as *Glaucidium pinnatum* or *Hydrastis jesoensis*, which only exist in herbaria or in literature, be taken as examples in a phyto-geographical work, and erroneous conclusions be drawn therefrom.

#### LEUCOTHOË.

A very interesting case of the occurrence of a N. American genus *Leucothoë* in Japan was first made known by A. Gray in the year 1859.\* He described the plant as a new species calling it *L. chlorantha* on account of the flower colour mentioned by the collector. He probably did not notice that there was another plant belonging to the same family with the same name, which is sometimes referred to a different genus as *Agarista chlorantha*. For this reason Maximowicz changed the specific name to *Grayana* in 1872.† H. de Boissieu is wrong, when he says " . . . plantae a C. Wright in itinere Japonico lectae, et ab A. Gray, Bot. Jap. sub nomine *L. chloranthae*, DC. enumeratae. Huic a *L. chlorantha vera* alienae, Max. l.c. merito nomen *L. Grayanae* dedit, . . ."‡, because there is no evidence that Gray took our plant for the South American plant and enumerated it as De Candolle's species. Perhaps Grays original paper was not at Boissieu's disposal, and his remark was derived from a wrong source.

Maximowicz† added a new species called *L. Tschonoskii*, which is very closely related to the former species, but differs from it in a few not very conspicuous points. In "Les Ericacées du Japon," H. de Boissieu§ enumerates two species of this genus: 1, *L. Tschonoskii*, and 2, *L. Grayana*, Maxim. He remarks under the former species "a specie sequenti *foliorum et collarae forma tantum*, sed, ut mihi videtur, sat distincta." As he had a good many specimens of the latter species, he was able to break it up into three varieties: *a*, *typica*, *β*, *intermedia*, and *γ*, *Wrightiana*.

It seems to me that these authors lay too much stress on the form and texture of the leaf as a ground for separating species and varieties. But if they once visited the places where *L. Grayana* grows and examined living specimens, they would assuredly change their opinion. In fact in Japan there are only two species of this genus: one is *L. Keiskei*, Miq.|| and the other is *L. Grayana*, Maxim. These two are endemic in Japan; the former is distributed over Central and South Western Japan, the latter in Central and Northern Japan.

*L. Keiskei* scarcely varies, while *L. Grayana* is very polymorphic. As pointed out above, it is not safe to attempt to distinguish forms by the shape and texture of the leaf. Maximowicz also separates *L. Tschonoskii* from *L. Grayana* by the character of the corolla,

\* A. Gr. Botany of Japan, p. 399.

† Maxim. in Mel. Biol., viii, p. 613.

‡ H. de Boiss. in Bull. Herb. Boiss., v, p. 911 (1897).

§ Boiss., l.c.

|| Miq. in Ann. Mus. Bot. Lugd.-Bat., i, p. 32.



which in the former plant is ovoid-globose, while in the latter it is globose. This character, however, depends upon the time of flowering, both types of corolla can be found on one and the same species. Such a slight variation is quite insufficient ground for distinguishing species. The last characteristic of *L. Tschonoskii* given by Maximowicz is the pubescence of the ovary. Still as Boissieu\* points out, the hairy ovary occurs also in certain forms of *L. Grayana*.

In reality the hairiness of the ovary is the important character of the variety of *L. Grayana*, and the leaf has here no significance whatever.

The species should, therefore, be arranged as follows :—

*Leucothoe Grayana*, Maxim., emend. a *Maximowicziana*, Takeda., *L. Grayana*, Maxim. in Mém. Biol., viii, p. 613. *L. Grayana*, a *typica*, Boiss. in Bull. Herb. Boiss., v, p. 911.

Ovario glabro.

β. *Tschonoskii*, Takeda., *L. Tschonoskii*, Maxim., l.c., *L. Grayana* β *intermedia* et γ *Wrightiana*, Boiss., l.c.

Ovario styloque pubescente.

It seems to me probable that C. Wright collected several specimens of this plant in the neighbourhood of Hakodate, most of which are probably the variety α, from which this species was described by A. Gray and Maximowicz. A few must be the variety β, on which Boissieu established his var. *Wrightiana*.

#### TRIPTERYGIUM.

This very interesting genus of *Celastraceae* was discovered by Wilford in Formosa in the year 1858. Sir J. D. Hooker described the plant under the name of *T. Wilfordi*.† Several years later a second species, *T. Bullockii*, was published by H. F. Hance,‡ which is said to differ from *T. Wilfordi* in having a 6-lobed stigma and branchlets covered with ferruginous hairs. Maximowicz, in his paper on the Eastern Asiatic *Celastraceae*,§ regards these plants as distinct species, and distinguishes them by the number of the stigmatic lobes, and by the shape of the fruit. This classification was adopted by Lösener,|| although Hemsley¶ states *T. Bullockii*, Hance, is the same as Hooker's plant.

A few years after the publication of *T. Wilfordi* and before *T. Bullockii* became known, E. Regel\*\* gave a figure and a description of *T. Wilfordi*, which was drawn from the specimen sent to Hooker and determined by him.

According to this description, the plant has a 6-lobed stigma and glabrous branchlets. Thus, the number of the stigmatic lobes appears to be inconstant, since Hooker and Regel give a different number in the same species. Recently Matsuda made an attempt to reduce Hance's plant to *T. Wilfordi* as a variety of the latter.††

\* Boiss., l.c.

† Hooker, in Benth. et Hook. Genera Pl., i, p. 368.

‡ Hance, in Journ. Bot., 1880, p. 259.

§ Maxim., in Mém. Biol., xi, p. 206 (1881).

|| Lösener, in Engl. u. Pr. Pflanzenfam., iii, 5, p. 213 (1892).

¶ Hemsley, in Index Fl. Sinensis, i, p. 125 (1886).

\*\* Regel, Gartenfl., 1869, p. 105 t. 612.

†† Matsuda, in Tōkyō Bot. Mag., xxiv, p. 286 (1910),

As a result of my investigation at Kew and the British Museum, I have been led to the conclusion that our previous conception of the genus *Tripterygium* requires alteration. Two kinds of flower occur in this genus, as in some other members of this family: one is hermaphrodite and the other male with unfertilized ovules. The male flower assumes the same appearance as the hermaphrodite, with the difference that the stigma is imperfectly lobed, and incapable of receiving pollen grains. Hooker's description of the stigma was probably based on the male flower, in which the style is slightly shorter than in the other, clavate in shape, and the stigma is more or less slightly 3-lobed. The diagnosis of the stigma in this genus must therefore be emended to read "6-lobed in the normal flower."

As to whether *T. Bullockii* should be regarded as a distinct species, or is merely a variety, or identical with *T. Wilfordi*, I entirely agree with Hemsley that these two plants are the same, and that *T. Bullockii* is not even a variety.

One important thing to be mentioned here is the difference between the specimens of *T. Wilfordi* from Formosa and those from Japan. The former is the plant described by Hooker and also by Hance, and the latter by Regel; it is distributed in Corea as well. The difference was also noticed by Matsuda, but unfortunately he used entirely wrong names. The Japanese form appears very similar to the Formosan at first glance, but differs in characters of indumentum, texture and crenation of the leaf, more floriferous inflorescence, and in the shape of the fruit.

A new arrangement of the species and forms of this genus is given below.

*Tripterygium Wilfordi*, Hook. f. in Benth. et Hook. Gen. Pl. i, p. 368.—Hemsl. Ind. Fl. Sin. i, p. 125, excl. spec. c Corea; *T. Bullockii*, Hance, in Journ. Bot. 1880, p. 259.—Maxim. in Mém. Biol. xi, p. 206; *T. Wilfordi* var. *Bullockii*, Matsuda, in Tôkyô Bot. Mag. xxiv, p. 286.

*Folia* subcoriacea, longe et saepe caudato-acuminata, margine crenata, utrinque 5- vel 6-costata. *Rami* castaneo-brunnei, verrucosi, ferrugineo-hirtelli, ramulis ferrugineo-tomentosis. *Fructus* alis basi plerumque truncatis vel leviter cordatis, apice subtruncatis vel leviter emarginatis, margine integris.

FORMOSA. On banks of the River Sanar, *C. Wilford*; Tamsui, Oldham, 1864; Kelung, *C. Ford*, 1884; *Faurie*, 75.

CHINA. Great Black Mt. 5-7000 ft., *Hancock*, 284; N.W. Yunnan, *G. Forrest*, 808; "in collibus demissis secus fl. Liang, reg. septentr. provinciae Hunan," *Bullock*, 1878, hb. Hance, 20,692.

Var. *exesum*, *Sprague* et *Takeda*.

Differt a typo foliis utrinque 6-9-costatis, fructibus paulo majoribus, maturis purpureo-rubris, alis basi cordatis apice profunde et aperte emarginatis.

CHINA. Yunnan: Mengze, N. Mts., 1520 m., *A. Henry*, 10,203.

This variety is very peculiar in the shape of the fruit, which is deeply cut at the apex. The colour of the fruit corresponds to the Chinese description given in *Chi wu ming shi t'u k'ao*, vol. xxxvi, fol. 15. This variety may perhaps be a distinct species, but owing to the lack of ample material, we hesitate to raise it to the rank of species.



*Tripterygium Regelii*, *Sprague et Takeda*, sp. nov.; *T. Wilfordi*, Regel, in *Gartenfl.* 1869, p. 105, tab. 612; *T. Wilfordi*, Maxim. l.c. — Matsuda, l.c.

A specie praecedente differt praesertim foliis majoribus chartaceis acutis vel acuminatis utrinque 6–9-costatis margine grosse crenatis; ramis minus verrucosis, glabris vel pilosis, ramulis glabrescentibus vel albido-hirtellis; inflorescentia floribunda; fructibus majoribus, alis basi profunde cordatis apice emarginatis margine irregulariter sinuatis.

JAPAN. Kujûsan (errore Kunjôsan appell.), prov. Kyûshû, *Maximowicz*, 1863; Hondôji, prov. Uzen, *R. Yatabe*, 1887; Mt. Chokai, prov. Ugo, *M. Komai*, 1906.

COREA. Seoul, *Carles*, 1884; "fluvium Jalu super., districtus Samsu circa Sangsu-u," *V. Komarov*, 1897.

## XXV.—SAPIUM CLADOGYNE, A NEW SPECIES FROM BRITISH GUIANA.

J. HUTCHINSON.

In December, 1910, a series of specimens of *Sapium* collected by Mr. F. A. Stockdale, Assistant Director of Agriculture, and others in British Guiana were communicated to Kew by Prof. J. B. Harrison, Director of Agriculture, for comparison with the type of *S. Jenmani*, Hemsl.

A careful examination proved that two species were represented, which, although apparently identical in their vegetative parts, could be distinguished by a remarkable and interesting difference in the form of the inflorescence. Mr. Stockdale calls attention to this difference in a paper on the Indigenous Rubber Trees of British Guiana, published in *Timehri: The Journal of the Royal Agricultural and Commercial Society of British Guiana*, January, 1911, p. 24.

In *S. Jenmani* as shown by Hemsley's figure in Hook. Ic. Pl. t. 2649, which we regard as representing the type of the species, the inflorescence is unbranched and the female flowers are disposed for some distance along the lower part of the rachis, the upper part being male. The flowers of both sexes are evidently mature about the same time, or they are perhaps slightly protogynous. In *S. cladogyne*, the name proposed for the new species, however, as pointed out by Mr. Stockdale, the inflorescence consists of a central spike with two very short lateral branches at the base which bear the female flowers. During the flowering stage of the male these female branches are detected only by close examination. The female flowers evidently attain maturity a considerable time after the fall of the male, the axis bearing the latter soon articulating at the base and leaving a large scar which can be plainly seen in the young and also in the mature fruiting stages.

It appears to the writer that this difference in the time of flowering of the two sexes constitutes another important character serving to separate the species, for in *S. Jenmani* it is highly probable that pollination is affected by male flowers from the same individual, whereas in *S. cladogyne* this is obviously not possible. Field notes on this point would be of interest,

In a communication received by the writer in October, 1911, Mr. Stockdale states that since his paper was published in the *Journal* quoted above it has come to his notice that the latex produced by plants of the new species (*S. cladogyne*) is somewhat different from that obtained from *S. Jenmani*, but that complete analyses had not then been made. He adds the important fact that the growth of young trees of the two species under cultivation is decidedly different, the primary branches of *S. Jenmani* being directed upwards and forming an acute angle with the stem, whilst in the new species (*S. cladogyne*), the branches spread almost horizontally. He further states that the colour of the leaves is darker in the latter species.

*Sapium cladogyne*, *Hutchinson*, sp. nov.; affinis *S. Jenmani*, Hemsl., spicis ♂ terminalibus post anthesin deciduis, spicis ♀ 2 suboppositis sub maris anthesi vix evolutis ad basin rhachis maris sitis differt.

*Arbor* 6-7 m. alta; ramuli juniores glabri. *Folia* sparsa, oblonga vel oblongo-elliptica, obtuse caudato-acuminata, basi plerumque cuneata, 4-12 cm. longa, 2-4.5 cm. lata, integra vel remotissime glanduloso-denticulata, chartacea, crebre minuteque pellucidopunctata, nervis primariis lateralibus utrinque 8-10 arcuatis prominentibus; petioli 1-2.5 cm. longi, apice glandulis lateralibus sessilibus parvis instructi. *Inflorescentiae* bisexuales, ramulis lateralibus brevibus terminatae. *Spicae* ♂ terminales, graciles, ad 12 cm. longae, post anthesin deciduae; spicae ♀ 2, suboppositae, sub maris anthesi vix evolutae, ad basin rhachis sitae. *Flores* ♂ 8-9 aggregati, glandulis geminatis peltatis suffulti; bracteeae semiorbiculares; bracteolae setulosae. *Calyx* bipartitus, glaber; segmenta suborbicularia. *Stamina* 2; filamenta 1 mm. longa, crassa, glabra; antherae 0.75 mm. latae. *Flores* ♀ non visi. *Infructescentiae* geminatae, pedunculatae, 4-7 cm. longae; rhachis leviter flexuosa, glabra. *Capsulae* crustaceae, 1-loculares, 1 spermae, subglobosae, circiter 0.7 cm. diametro, 2-valves. *Semina* subglobosa, paullo compressa, 0.5 cm. diametro, extus pulposa. *S. Jenmani*, Hemsl. in Hook. Ic. Pl. sub. t. 2649, as to Jenman, 7505; Pax in Engler, Pflanzenr. Euphorb.-Hippomaneae, p. 217, partly.

BRITISH GUIANA. Head of Pomeroon River, *Jenman*, 7505! Arriah Trib; Upper Pomeroon River, *Beckett*, 8628! Fort Island; Essequibo River, *Beckett*, 8767! 8768! *Stockdale*, 8766! Cultivated in the Botanic Gardens, Georgetown, *Foot*! *Bartlett*, 8724! *Stockdale*, 8765! *Greeves*, 8766!

## XXVI.—DIAGNOSES AFRICANAE, XLVIII.

1341. *Alsodeiopsis Chippii*, *Hutchinson* [Olacaceae-Icacineae]; affinis *A. Rowlandii*, Engl., sed ramulis junioribus dense strigosopilosis, foliis supra longe setosis, petiolis brevioribus, inflorescentiis paucifloris differt.

*Frutex*; ramuli juniores graciles, dense strigoso-pilosi. *Folia* oblongo-elliptica vel leviter oblongo-oblanceolata, acutissime acuminata, basi inaequaliter rotundata, 7-13 cm. longa, 3-5 cm. lata,



integra, membranacea, supra longe setosa, subtus pilosa, nervis lateralibus utrinque 8-10 paullo arcuatim ascendentibus supra distinctis subtus prominentibus, nervis tertiariis subparallelis; petioli 3-4 mm. longi, strigosopilosi. *Inflorescentia* brevis, pauciflora, brevissime pedunculata, pedunculo 0.5 cm. longo piloso; pedicelli 5-7 mm. longi, graciles, pubescentes. *Sepala* subulata, 1.5 mm. longa, extus pubescentia. *Petala* libera, flava, lanceolata, subobtusata, 4 mm. longa, 1.25 mm. lata, extus parce pubescentia, intus glabra. *Stamina* quam petala breviora; antherae 0.75 mm. longae. *Ovarium* subcylindricum, adpresse pilosum, in stylum glabrum gracilem petala vix aequantem attenuatum. *Fructus* ignoti.

TROPICAL AFRICA. Gold Coast: Axim district; near Dompem (Atissiabo), Chipp, 46.

1342. *Buchenroedera glabrescens*, Dümmer [Leguminosae-Genisteae]; *B. vimineae*, Presl, affinis sed habitu graciliore undique glabrescens, foliolis brevioribus anguste lanceolatis, racemis laxis distat.

*Herba* perennis, ubique floribus exceptis glabrescens; caules annui florescentes pauci vel conferti, fere stricti, graciles, subteretes, ad 30 cm. alti, dense foliosi. *Folia* ascendentia, trifoliolata, exstipulata; petioli teretiusculi, circiter 2 mm. longi; foliola saepe conduplicata, anguste subfalcato-lanceolata, acuta, petiolis triplo aut quadruplo longiora, dorso costata, subcoriacea. *Racemi* terminales ad 3.5 cm. alti, 8-15 flori, floribus perbreviter pedicellatis; bractea subulato-lanceolata calycis tubum fere aequans aut eo brevior. *Calyx* 3.5 mm. longus, parce sericeus mox glaber, dentibus obtuse deltoideis tubo triplo brevioribus. *Vexilli* limbus fere orbiculatus, incrassatus, 4 mm. diametro, extus parce sericeus, ungui sulcato fere aequilongus; alae graciliter unguiculatae, circiter 5 mm. longae, limbis oblique navicularibus obtusis basi auriculis ornatis; carina alis similis nisi lamina angustiore. *Ovarium* sericeum, 8-10 ovulatum, stylo arcuato glabro ovario saltem duplo longiore.

SOUTH AFRICA. Eastern Region: Natal; without precise locality, Gerrard, 1090.

Few of the *Buchenroedera*s exhibit a glabrescent habit, this species and *B. pauciflora*, Schlechter, being exceptions; the species under consideration exhibits an affinity to *B. viminea*, Presl, but the character alluded to, the plant's slender habit, shorter lanceolate leaflets and more laxly flowering racemes render the species easy of identification.

1343. *Buchenroedera Macowanii*, Dümmer [Leguminosae-Genisteae]; *B. multiflora*, Eckl. et Zeyh., habitu magis divaricato-ramoso, foliolis brevioribus obovato-cuneatis, capitulis 2-3 floris, floribus minoribus distinguenda.

*Fruticulus* divaricato-ramosissimus, superne dense foliatus, ad 20 cm. altus, primo argenteo demum fulvido-sericeus, ramulis ultimis circiter 3.5 cm. longis. *Folia* trifoliolata; petioli 1 mm. longitudinis vix excedens; foliola saepissime conduplicata, obovato-cuneata, reflexo-mucronata, inter se aequilonga vel terminalia paulo longiora, 2-3 mm. longa, utrinque creberrime sericea, mox supra glabrescentia, coriacea; stipulae binae mox deciduae, petiolos paullo superantes, falcato-subulatae, apice valde deflexae.

*Inflorescentia* terminalis, sessilis, umbellatim 2-3-flora, floribus breviter pedicellatis bracteolis subulatis parvulis munitis. *Calyx* 4 mm. longus, extra fulvido-hirsutulus, dentibus deltoideis tubo triente brevioribus. *Vexillum* breviter unguiculatum toto 6 mm. altum, limbo suborbiculari postice fulvo-sericeo (sicco pallide lilacino margine albedo); alae graciliter unguiculatae, glabrae, limbis oblongis rotundatis basi truncatis unguibus aequilongis; carina alis paulo brevior, lamina naviculari 3-3.5 mm. longa, acutata basi auriculis parvulis ornata, extra sericea. *Ovarium* 2 mm. longum, valde fulvo-hirtellum, stylo ovario duplo longiore glabro arcuato; stigma fere simplex.

SOUTH AFRICA. Central Region: Somerset Div.; on Bruintjes Hoogte, 1500 m., *Mac Owan*, 1738.

1344. *Buchenroedera uniflora*, *Dümmer* [Leguminosae-Genisteae]; *B. Macowanii*, *Dümmer*, similis, nisi habitu magis prostrato, indumento crassiore villosulo-tomentosa, floribus plerumque solitariis, leguminibus calyces valde excedentibus.

*Suffrutex* adpresse prostratus, conferte divaricato-ramosissimus, dense foliatus, primo undique praeter flores fulvido-villosulo-tomentosus. *Folia* trifoliolata; petioli 1 mm. longi aut longiores, foliola petiolis duplo vel triplo longiora, saepissime conduplicata, anguste cuneata, acutata, inter se subaequilonga, incrassata; stipula unica mox decidua, foliolis similis. *Flores* axillares, solitarii (raro bini), breviter pedicellati. *Calyx* circiter 4 mm. longus, extra hirtellus, dentibus deltoideis acutis tubo duplo brevioribus. *Corolla* glaberrima; *vexillum* unguiculatum, spatulatum, acutum, basi fere truncatum, toto 5 mm. longum; alae leviter curvatae, obtusae, basi truncatae, omnino 5-6 mm. longae; carina alis similis sed latior unguibus gracilibus limbo fere aequilongis. *Legumen* turgido-compressiusculum, rectum, oblongum, ad 10 mm. longum, 3 mm. latum, hirtellum, 6-10 spermum.

SOUTH AFRICA. Central Region: Graaff Reinet Div.; on the summit of Mount Koudveld, Sneeuwberg Range, 1500 m. *Bolus*, 2580.

The relatively long legume distinguishes this species from any of its nearer allies and is eminently suggestive of *Lotononis*, but the short, almost equally 5-toothed calyx emphasises its approximation to this genus.

1345. *Melolobium decorum*, *Dümmer* [Leguminosae-Genisteae]; *M. candicans*, *Eckl. et Zeyh.*, peraffinis sed habitu robustiore, foliolis majoribus, floribus plurimis majoribus, bracteis majusculis calyces fere aequantibus recedit.

*Frutex* divaricato-ramosissimus, spinosus ad 40 cm. altus, primo puberulo-viscidulus, demum glabrescens, spinis gracilibus nudis aut 3-6-floris luteis ad 4 cm. longis. *Folia* trifoliolata; petioli ad 3 mm. longi; foliola obovato-cuneata, vix mucronulata vel rotundata, inter se fere aequilonga vel lateralibus paulo breviora ad 8 mm. longa, 2.5 mm. lata, dorso costata, coriacea mox glabrescentia, pallide viridescencia; stipulae binae, arrectae, petiolos subaequantes vel superantes dimidiatim ovatae vel ovato-lanceolatae, cordatae, acutae. *Flores* flavidi, pedicellis circiter 1 mm. longis; bractea stipulis similis; bracteolae singulae aut binae, lanceolatae, acuminatae, foliosae, calycem fere aequantes. *Calyx* extus pubescens,



7-8 mm. longus. *Corolla* glabra; vexillum unguiculatum, 10 mm. altum, limbo fere orbiculato in unguem subaequilongum sensim attenuato; alae 8 mm. longae, limbis inferne conduplicatis oblongiusculis obtusis basi truncatis; carina alis fere aequilonga, graciliter unguiculata, limbo anguste naviculari auriculato. *Ovarium* pubescens, stylo graciliter arcuato glabro.

**SOUTH AFRICA.** Central Region: Graaff Reinet Div.; on the slopes of mountains near Graaff Reinet, 1140 m. *Bolus*, 483.

An exceedingly handsome and floriferous species, worthy of cultural attention, most closely allied to *M. candicans*, Ecklon & Zeyher, but distinguished by the more robust, floriferous habit, larger leaves, flowers and bracteoles.

1346. *Melolobium glanduliferum*, Dümmer [Leguminosae-Genisteae]; species *M. decumbenti*, Benth., persimile, sed spinis longioribus vix furcatis, foliis majoribus et cum calyce stipitate glandulosis, floribus paullulo minoribus, vexilli lamina ovato-orbiculari differt.

*Suffrutes* decumbens, caulibus ad 30 cm. longis pubescenti-hispidulis, ramulis lateralibus saepe confertis brevibus in spinas 2-3-floras luteas glabrescentes extensis; spinae plerumque simplices, ad 2.5 cm. longae. *Folia* trifoliolata, pubescentia, stipitate glandulosa; petioli 1-3 mm. longi, foliola oblanceolata-cuneata, rotundata aut acutata, inter se subaequalia, ad 5 mm. longa, vix coriacea, pallide viridia; stipulae binae, arrectae, semicordato-lanceolatae, acutae, petiolos subaequantés. *Flores* perbreviter pedicellati, ad spinas inferne dispositi, flavidi?; bractea stipulis similis; bracteola lanceolata, acuta, calycis tubum fere aequans. *Calyx* extra pubescens, glandulosus, 6 m. longus. *Corolla* glabra; vexillum unguiculatum, 8 mm. altum, lamina ovato-orbiculata ungui fere aequilonga; alae graciliter unguiculatae, vexillo aequilongae, oblongiusculae, obtusae, basi fere truncatae; carina alis similis, nisi minor et basi sagittata. *Ovarium* paulo hirsutulatum, stylo arcuato glabro aequilongum.

**SOUTH AFRICA.** Kalahari Region: Basutoland; without precise locality, *Cooper*, 703.

A species having the xerophytic spinescent habit of *M. decumbens*, Benth., but differing in its glandulosity, relatively larger leaflets and smaller flowers. Specimens gathered by Mr. A. Haagner at Brandfort in the Orange River Colony (ex *Herb. Conrath* and *Kew*, 1189) may belong here, but lack of flowers renders this point undecisive.

1347. *Melolobium macrocalyx*, Dümmer [Leguminosae-Genisteae]; *M. cernuo*, Eckl. et Zeyh., affinis sed habitu magis distiche ramoso parce folioso, indumento canescente, foliolis brevioribus, floribus arrectis haud nutantibus, calyce corollam fere superante differt.

*Fruticulus* inermis, gracilis, laxe distiche ramosus, parce foliosus ad 40 cm. altus ubique corollis exceptis canescens, ramis lateralibus adscendentibus teretibus ad 8 cm. longis. *Folia* trifoliolata, magis minusve arrecta; petioli ad 2 mm. longi; foliola lineari-oblanceolata, acutata, carnosula, supra canaliculata, subtus convexa, terminalia ad 7 mm. longa, lateralia paullo aut duplo breviora; stipulae binae, arrectae, oblique lanceolato-ovatae, acutatae, basi paullulo auriculatae, ad 4 mm. altae, intra glabrescentes. *Spicae* plurimae ad 5 cm. altae, 4-7 florum, floribus arrectis flavidis?; bractea stipulis similis nisi

major, calycis tubum aequans; bracteolae ad calycis basem, binae, lanceolatae, acutae. *Calyx* 6-7 mm. longus, segmentis binis superioribus deltoideis tubo aequilongis, dentibus ternis infimis 1-1.5 mm. longis. *Corolla* in calyce fere inclusa, glabra; vexillum spatulatum, lamina concava obovata in unguem brevem attenuata; alae unguiculatae, 6 mm. longae, limbis apicem versus angustatis basi vix auriculatis; carina alis similis nisi latior, apice magis rotundata. *Legumen* immaturum? complanatum, oblongum, rectum, 10 mm. longum, canescens, 2-spermum. *M. cernuum*, Benth. in Hook. Lond. Jour. Bott. iii, 1844, 362 (in part).

SOUTH AFRICA. Kalahari Region: Griqualand West; between Klip Fontein and Knecht's Fontein, *Burchell*, 2169. Bechuanaland; plains south of Takun (between Pintado Fountain and Thermometer Fountain), *Burchell*, 2224.

GERMAN SOUTH-WEST AFRICA. Hereroland, Okahandya, 1300 m., *Dinter*.

Var. *longifolia*, *Dümmer*, typo similis nisi foliis longioribus.

Petoli ad 7 mm. longi; foliola saepe conduplicata, lineari-oblonga, obtusiuscula, terminalia ad 20 mm. longa, lateralia paullo breviora, supra glabrescentia, subtus pubescentia, margine incrassata.

SOUTH AFRICA. Central Region: Carnarvon Div.; at Buffel's Bout, *Burchell*, 1610.

A species distantly related to *M. cernuum*, Eckl. and Zeyh., but differing principally in the more robust canescent habit, the flowers, which are appressed to the axis and the large calyces. *Burchell*'s specimens were referred by *Bentham* to the former species, but the characters cited, in conjunction with the more north-central distribution of the species here described, does not support this identification.

1348. *Melolobium mixtum*, *Dümmer* [Leguminosae-Genisteae]; *M. glandulifero*, *Dümmer*, affine, sed magis divaricato-ramosa, petiolis foliola aequantibus aut superantibus, floribus minoribus, calycis labio inferiore superius valde superante recedit.

*Suffrutex* xerophyticus, divaricato-spinescenti-ramosus, prostratus vel decumbens, undique corollis exceptis valde patentim pubescens et stipitatum glandulosus; spinae ultimae 1-4-florae plerumque simplices, ad 4 cm. longae. *Folia* trifoliolata; petioli foliola aequantes aut superantes; foliola saepius conduplicata, oblanceolato-cuneata, vel lanceolata, acutata vel obtusa, inter se subaequilonga, ad 6 mm. longa, 2 mm. lata, dorso prominenter costata, laete viridia; stipulae binae, arrectae, foliosae, semicordato-lanceolatae vel cordatae, obtusae vel acutae, ad 4 mm. longae. *Flores* perbreviter pedicellati, flavidi, bracteis stipulis similibus nisi angustioribus, bracteolis lanceolatis calycis tubum vix aequantibus. *Calyx* 5-6 mm. longus, labio inferiore 3-dentato superius valde superante. *Corolla* glabra; vexilli lamina fere orbicularis, emarginata inferne paullulo auriculata, 4 mm. alta, ungui fere duplo longior; alae curvatae, toto 6 mm. longae, limbis late oblongiusculis rotundatis auriculatis; carinae limbus oblique breviter navicularis, rotundatus, basi auriculis ornatus. *Stylus* arcuatus, glaber, ovario aequilongus. *Legumen* vix falcatum, oblongum, subtorulosum, compressiusculum, circiter 1 cm. longum, 4 mm. latum, pubescens, glandulosumque, 3-spermum.



SOUTH AFRICA. Coast Region: Queenstown Div., *Cooper*, 217. Central Region: Somerset Div.; Somerset East, *Zeyher*, 105; Bosch Berg, 1200 m. *MacOwan*, 610. Albert Div., *Cooper*, 1393. Kalahari Region: Orange River Colony; Caledon River, *Burke*, *Zeyher*, 391; Bloemfontein, *Rehmann*, 3816; Harrismith, *Wood*, 4789. Eastern Region: Transkei; Tsomo, *Baur*, 475. Natal Coldstream, *Rehmann*, 6902.

Burke and Zeyher's specimens were associated by Bentham with his *M. decumbens*, but an inspection shews the erroneity of this procedure, and their closer relationship to *M. glanduliferum*, Dümmer, from which they principally differ in their more divaricately branched, less spinous habit, the equally long petioles and stipules, smaller flowers, and the upper 2-lobed lip of the calyx exceeding the lower 3-toothed lip. Superficially, the species under consideration resembles *M. microphylla*, Ecklon and Zeyher and *M. Burchellii*, N. E. Brown, but the short spreading pubescence distinguish it from the former, while the conspicuous glandulosity and scarcely acute leaflets differentiate it from the latter species immediately.

1349. *Melolobium Pegleri*, Dümmer [Leguminosae-Genisteae]; a *M. alpino* Ecklon et Zeyher, foliolis majoribus, stipulis petiolos plerumque subaequantibus, bracteis anguste ovatis distinguitur.

*Frutex* ad 5 dm. altus, ramis subfastigiatis perpaucis? ascendentibus simplicibus graciuseculis pubescenti-hispidulis foliatis. *Folia* trifoliolata; petioli graciles, ad 5 mm. longi; foliola oblanceolato-cuneata, mucronata aut emarginata, dorso costa prominente, parce puberula, supra mox glabra, subcoriacea, terminalia ad 20 mm. longa, 4 mm. lata, lateralia terminalibus subaequalia vel iis breviora; stipulae binae, arrectae, semicordato-lanceolatae, acutae plerumque petiolos fere aequantes. *Racemi* terminales, recti, 6-14-flori, floribus perbreviter pedicellatis; bractea anguste-ovata, acuta, 2-3 mm. longa; bracteolae binae, subulatae, minutae. *Calyx* extus viscidulo-pubescent, circiter 7 mm. longus. *Corolla* glabra; vexillum 8 mm. altum, lamina ovato-orbiculari emarginata ungui fere aequilonga; alae 8-9 mm. longae, limbis late oblongis rotundatis obtuse subsagittatis; unguis 3 mm. longi; carinae limbus anguste navicularis, rotundatus, basi subsagittatus. *Stylus* crassiusculus, arcuatus, glaber, ovario sericeo brevior. *Legumen* oblongum, subfalcatum, subtorulosum, subcompressiusculum, ad 2 cm. longum, 3-4 spermum, viscidulo-pubescent.

SOUTH AFRICA. Eastern Region: Xalanga District; Cala, hill-side, 1200 m. *Alice Pegler*, 1739.

1350. *Leucadendron Schlechteri*, *Phillips et Hutchinson* in *Dyer Fl. Cap.* vol. v. sect. 1, p. 521, anglice [Proteaceae-Proteeae]; affinis *L. Schinziano*, Schlechter, bracteis ♂ breviter pubescentibus vel tomentellis, ♀ villosio-tomentosis, inflorescentiis ♂ et ♀ dissimilibus differt.

*Rami* teretes, dense appresse pubescentes; ramuli juniores appresse albo-tomentosi. *Folia* lineari-lanceolata vel oblanceolata, inferiora 1.2-2 cm. longa, 2.5-4 mm. lata, superiora majora, 3-5 cm. longa, 5-6 mm. lata, omnia apice mucronata, rigide coriacea, utrinque dense appresse tomentosa. *Inflorescentia* ♂ solitaria, terminalia, depresso-globosa, vix 1.5 cm. diametro; bractee

lanceolatae, acutae, 2 mm. longae, villosae. *Perianthii* tubus 3·25 mm. longus, dense pilosus; segmenta 2·5 mm. longa, breviter villosa; limbus lanceolato-ellipticus, subacutus, 1·5 mm. longus, extus villosus. *Antherae* lineares, 1·25 mm. longae. *Stylus* filiformis; stigma clavatum, subacutum, 1·25 mm. longum. *Inflorescentia* ♀ terminalis, depresso-globosa, 2-3 cm. diametro; bractee obovatae, 8-10 mm. longae, 4-5 mm. latae, exteriores abrupte acutae, extus dense villosae, intus glabrae et longitudinaliter striatae. *Perianthii* segmenta 9 mm. longa, linearia, villosa; limbus 1 mm. longus, ovatus, subacutus, villosus. *Staminodia* 0·5 mm. longa, oblonga, minute apiculata. *Squamae hypogynae* 1 mm. longae, ovatae, acuminatae. *Stylus* 7 mm. longus, oblique insertus, filiformis, glaber; stigma bilobum. *Ovarium* 3 mm. longum, glabrum.

SOUTH AFRICA. Cape Colony: Clanwilliam Div.; Cedarberg Range, at Ezelsbank, *Schlechter*, 8829, 8830.

1351. *Leucadendron radiatum*, *Phillips et Hutchinson* in *Dyer Fl. Cap.* vol. v., sect. 1, p. 529, *anglice* [Proteaceae-Proteeae]; species inflorescentis foliis dense appresse tomentosis numerosis patulis circumdatis distinctum.

*Suffrutex* robustus, circiter 0·75 m. altus; rami patuli; ramuli erecti, robusti, leviter sulcati, longe pilosi. *Folia* oblanceolata, apice obtuse callosio-mucronata, 1·2-2 cm. longa, 3-5 mm. lata, rigide coriacea, utrinque tenuiter pubescentia. *Inflorescentia* ♂ terminalis, subglobosa, circiter 1·3 cm. diametro, foliis appresse tomentosis numerosis involucrata; bractee ovato-lanceolatae, obtusae, 1·5 mm. longae, villosae. *Perianthii* tubus 2 mm. longus, villosus; segmenta spathulato-linearia, 3 mm. longa, pubescentia; limbus oblongus, obtusus, 1 mm. longus, pubescens. *Antherae* lineares, vix 1 mm. longae. *Stylus* teres, 4 mm. longus, glaber; stigma clavatum, subacutum, vix 1 mm. longum. *Squamae hypogynae* filiformi-lineares, 1 mm. longae. *Inflorescentia* ♀ solitaria, terminalis, ovoidea, circiter 1·2 cm. longa et diametro; bractee transverse oblongae, 2·5 mm. longae, 4·5 mm. latae, tomentosae. *Perianthii* tubus 2·5 mm. longus, pilosus; segmenta linearia, 1·5 mm. longa, villosa; limbus oblongus, obtusus, hirsutus. *Squamae hypogynae* lineares, 1 mm. longae. *Ovarium* ellipsoideum, 1 mm. longum, glabrum. *Infructescentia* ellipsoidea, circiter 2·5 cm. longa, 2 cm. diametro; bractee circiter 15-seriatae, transverse oblongae, truncatae, circiter 5 mm. longae, 1·2 cm. latae, extus appresse pubescentes, apice fere glabrae. *Fructus* non visi.

SOUTH AFRICA. Cape Colony: Riversdale Div.; on the summit of Kampsche Berg, *Burchell*, 7110.

1352. *Leucadendron coriaceum*, *Phillips et Hutchinson* in *Dyer Fl. Cap.* vol. v., sect. 1, p. 531, *anglice* [Proteaceae-Proteeae]; affinis *L. lanigeru*, Buek, foliis obovatis apice rotundatis 8-14 mm. longis glabris, inflorescentiis ♂ paucibracteatis differt.

*Rami* teretes, breviter pubescentes vel glabri. *Folia* oblanceolata, vel spathulato-obovata, apice rotundata, obtuse mucronata, 8-14 mm. longa, 4-6·5 mm. lata, rigide vel crasse coriacea, glabra. *Inflorescentia* ♂ solitaria, terminalis, vix 2 cm. diametro, subdepresso-globosa; bractee lanceolatae, subobtusae, 2 mm. longae. *Perianthii* tubus 2·5 mm. longus, inferne glaber, superne pilosus;



segmenta spathulato-lineararia, 4 mm. longa, appresse pilosa; limbu oblongus, subacutus, 1·5 mm. longus, pubescens. *Antherae* lineares 1 mm. longae. *Stylus* cylindricus, 5 mm. longus, basi longe pilosus; stigma ellipsoideum, subacutum, 1 mm. longum. *Squamae hypogynae* filiformes, 3 mm. longae. *Inflorescentia* ♀ foliis superioribus cincta; bractee ovatae, acuminatae, 4 mm. longae, villosae. *Perianthii* segmenta spathulato-lineararia, 6·5 mm. longa, superne villosa, inferne glabra; limbus oblongus, obtusus vel subobtus, 1 mm. longus, villosus. *Staminodia* lineararia, vix 1 mm. longa. *Squamae hypogynae* lineares, longe acuminatae, 2·25 mm. longae. *Ovarium* compressum, alatum, 1 mm. longum; stylus linearis, 4·25 mm. longus, glaber, oblique insertus; stigma obliquum.

SOUTH AFRICA. Cape Colony: Bredasdorp Div.; near Elands Kloof, *Mund*, 5; near Kars River, *Indwig*. Swellendam Div.; mountains near Swellendam, (*Pappe*?).

1353. *Leucadendron Galpinii*, *Phillips et Hutchinson* in *Dyer Fl. Cap.*, vol. v., p. 535, anglice [Proteaceae-Proteeae]; affinis *L. ramosissimo*, Buek, sed foliis obtusis bracteis ♂ exterioribus tomentosis nec coloratis quam floribus brevioribus differt.

*Ramuli* ♂ graciles, ♀ robustiores, tenuiter pubescentes, juniores acute angulares, demum teretes. *Folia* ramulorum ♂ quam ramulorum ♀ minora, illa 1·2-2·5 cm. longa, 2-3 mm. lata, haec 2·5-4·5 cm. longa, 2-3·5 mm. lata, omnia lineari-oblongata, obtusa, longitudinaliter striata vel rugosa, utrinque glabra. *Inflorescentia* ♂ solitaria, terminalis, globosa, circiter 1 cm. diametro; bractee lanceolatae, 1·5 mm. longae, dense villosae. *Perianthii* tubus cylindricus, 2 mm. longus, pubescens; lobi 2·5 mm. longi, pubescentes; limbus lanceolatus, subacutus, 1 mm. longus, pubescens. *Antherae* 1·25 mm. longae, lineares. *Stylus* 3 mm. longus, filiformis, inferne pubescens; stigma 0·5 mm. longum, ellipsoideum vel clavatum. *Inflorescentia* ♀ oblongo-ellipsoidea, 2-3 cm. longa, 2-2·5 cm. diametro; bractee 6 mm. longae, 10 mm. latae, basi villosae, ceterae pubescentes, ciliatae. *Perianthii* segmenta 9 mm. longa, inferne glabra, superne villosa; limbus linearis, 0·5 mm. longus. *Ovarium* 2·5 mm. longum, ellipsoideum, longe pilosum; stylus 5 mm. longus, cylindrico-filiformis, basi parce pilosus; stigma truncatum vel minute bifidum.

SOUTH AFRICA. Cape Colony: Riversdale Div.; Milkwoodfontein, *Galpin*, 4439; without precise locality, *Thom*, 69, 71, 538; *Bowie*.

1354. *Leucadendron Phillipsii*, *Hutchinson* in *Dyer, Fl. Cap.*, vol. v., sect. i., p. 538, anglice [Proteaceae-Proteeae]; affinis *L. adscendenti*, R. Br., bracteis ♀ inferne pubescentibus superne glabris differt.

*Frutex* usque ad 3 m. altus; ramuli adpresse puberuli vel pubescentes. *Folia* lineararia, apice subacute callosa, recta vel saepius falcata, 3-4·5 cm. longa, 2-3 mm. lata, rigide coriacea, glabra. *Inflorescentia* ♂ subglobosa, circiter 1 cm. diametro, foliis basi angustatis paucis involucreta. *Bractee* floriferae oblongae, obtusae, 1 mm. longae, dorso leviter carinatae, basin versus tenuiter pubescentes. *Perianthii* tubus cylindricus, 1 mm. longus, glaber; segmenta spathulato-lineararia, 2·5 mm. longa, glabra; limbus anguste oblongus, obtusus, 1·25 mm. longus, glaber. *Antherae* 1 mm. longae. *Stylus* 3·5 mm. longus, gracilis, glaber; stigma clavatum, 1·25 mm.

longum. *Inflorescentia* ♀ oblongo-ellipsoidea, circiter 1·2 cm. longa, bracteis brevibus acuminatis ciliatis involucrata. *Bractee* floriferae transverse oblongo-ellipticae, circiter 6 mm. longae et 8 mm. latae, coriaceae, medio dense adpresse pubescentes, margine et basi glabra. *Perianthii* tubus glaber; segmenta linearia, glabra. *Staminodia* parva. *Ovarium* compressum, suborbiculare, leviter emarginatum, alatum, 2·5 mm. diametro, glabrum; stylus 3 mm. longus, glaber; stigma clavatum. *Infructescentia* circiter 2·5 cm. longa, foliis plus minusve coloratis involucrata. *Fructus* compressi, alati, suborbiculares, leviter emarginati, 5 mm. diametro, glabri.

SOUTH AFRICA. Caledon Div.; Houw Hoek Mountains, Zeyher, 3648, partly. Knysna Div.; Paarde Berg, Burchell, 5192. Uniondale Div.; near Avontuur, Bolus, 2448. Without precise locality, Drège, Harvey, Bowie.

Named in compliment to Mr. E. P. Phillips, M.A., of the South African Museum, Cape Town, with whom the writer collaborated in monographing the genus *Leucadendron* for the Flora Capensis.

1355. *Leucadendron minus*, Phillips et Hutchinson in Dyer, Fl. Cap., vol. v., sect. 1, p. 541, *anglice* [Proteaceae-Proteeae]; affinis *L. lanigero*, Buck, sed foliis margine dense pubescentibus, inflorescentiis ♂ distincte involucratis, bracteis ♀ glabris differt.

*Frutex* circiter 1·25 m. altus; rami ascendentes; ramuli juniores teretes, dense villosi, foliis dense imbricatis fere occulti. *Folia* subaequalia, superiora inflorescentias circumdantes demum bractei-formia, oblongo-linearia vel leviter lineari-oblongata, acuta vel subacuta, 2·5–4·5 cm. longa, 3–6 mm. lata, coriacea, longitudinaliter rugosa vel striata, dense ciliata, tenuiter pubescentia. *Inflorescentia* ♂ foliis bracteiformibus occulta, circiter 8 mm. diametro, subglobosa. *Bractee* floriferae oblongae, apice rotundatae, 3 mm. longae, ciliatae. *Perianthii* tubus 1·5 mm. longus, subcompressus, glaber; segmenta 2 mm. longa, spathulato-linearia, glabra; limbus 1 mm. longus, linearis, obtusus vel subobtusus. *Antherae* 1·5 mm. longae, lineares. *Stylus* 3 mm. longus, filiformis, glaber; stigma clavatum. *Squamae hypogynae* filiformes, 1 mm. longae. *Inflorescentia* ♀ oblongo-ellipsoidea, 2 cm. longa, 1 cm. diametro. *Bractee* transverse lineari-oblongae, 3 mm. longae, 8 mm. latae, glabrae. *Perianthii* segmenta linearia, 4 mm. longa, glabra; limbus ovatus, subobtusus, 0·5 mm. longus. *Staminodia* linearia. *Ovarium* oblongum, compressum, 1 mm. longum; stylus 2·5 mm. longus; stigma truncatum.—*L. decorum*, var. *minus*, Buek in Drège, Zwei Pfl. Documente, 116, 198. *L. pubescens*, Meisn. in DC. Prodr. xiv. 226, as to preceding synonym, not of R. Br.

SOUTH AFRICA. Caledon Div.; tops of the mountains of Baviaans Kloof near Genadendal, Burchell, 7676. Genadendal, Drège.

Var. *glabrescens*, Phillips et Hutchinson, l.c. 542; ramuli breviter adpresse pubescentes; folia margine breviter pubescente excepto glabra vel fere glabra.

SOUTH AFRICA. Caledon Div.; Donker Hoek Mountain, Burchell, 8006.

1356. *Loranthus (Erectilobi) igneus*, Sprague [Loranthaceae]; affinis *L. dichroo*, Engl., a quo ramulis verruculosus, foliis basi



rotundatis vel obtusis, toro brevior, calyce distincte lobato recedit.

*Ramuli* dense verruculosi, novelli pilis ramosis ferrugineis facillime detergibilibus induti, 3-3.5 mm. diametro 30 cm. infra apicem; internodia 1-5 cm. longa. *Folia* opposita vel subopposita, ovato-lanceolata, 6-7 cm. longa, 2.2-3.3 cm. lata, apice subacuta, basi rotundata vel obtusa, tenuiter coriacea, glabriuscula; nervi laterales utrinque 4-5, satis obliqui, procul a margine anastomosantes, supra prominuli, subtus inconspicui; costa supra inconspicua, subtus prominens; petioli 8-10 mm. longi. *Flores* congesti (teste *Braun*). *Torus* calycecum campanulatus 1.4-1.5 mm. longus dentibus exclusis, pilis ferrugineis facile detergibilibus indutus praesertim superne. *Calycis dentes* triangulares, 0.25-0.5 mm. longi. *Corolla* in toto 3.5 cm. longa, ignea (teste *Braun*), extra pilis ferrugineis detergibilibus parce induta; tubus circiter 1.3 cm. unilaterally fersig, ampulla basali subglobosa 3 mm. diametro; lobi erecti, lanceolato-spathulati, 6.5-7 mm. longi, parte superiore ampliata lanceolata acuta 3.5 mm. longa 0.8-0.9 mm. lata intus strato duro basi abrupte terminato extra versus basin leviter carinata. *Filamenta* inflexa vel involuta, sursum sensim angustata, 4-4.5 mm. longa, basi extrorsum curvata, superne 0.5 mm. incrassata, dente ventrali anguste triangulari acuto 0.3 mm. longo; antherae oblongo-lineares, 1.6 mm. longae, 0.3 mm. latae. *Discus* crassissimus, 0.5 mm. altus, dentibus parvis acutis. *Stylus* superne metuliformis, parte incrassata 3.5 mm. longa, collo 1.7 mm. longo; stigma ovoideum vel ellipsoideum, 0.6-0.7 mm. longum.

TROPICAL AFRICA. German East Africa: Cheminda-Bakary Rondo, *Braun in herb. Amani*, 1169 (Herb. Berol.).

1357. *Loranthus* (Cupulati) *pachycladus*, *Sprague* [Loranthaceae]; affinis *L. angulifloro*, Engl., a quo foliis crasse coriaceis, petiolis brevioribus, bractea bifida, toro calycecum majore recedit.

*Frutex* dumalis, 1.5 m. diametro. *Rami* annotini validi, nodosi, cinnaeo-brunnei, 6-9 mm. diametro, cortice rimis irregularibus longitudinalibus; ramuli hornotini striati, glabri, exsiccando brunneo-virides, internodiis 1-5 cm. longis compressis 3-4 mm. latis. *Folia* opposita, elliptica vel late ovata, apice rotundata vel obtusissima, basi rotundata vel subcuneata (inferiora ramulorum obovata, e basi plurinervia), 4.5-7 cm. longa, 3-5 cm. lata, crasse coriacea, glabra, exsiccando opaca, rugosula, supra costa et nervis lateralibus prominentibus, subtus costa infra medium prominente nervis lateralibus saepius inconspicuis, venulis utrinque occultis; nervi laterales pinnatim dispositi (in foliis inferioribus tantum palmatim ortae); petioli 5-8 mm. longi, crassi. *Umbellae* in ramis senioribus fasciculatae, 4-5-florae. *Pedunculus* crassus, 5-8 mm. longus, superne ampliatus, depresso-pyramidalis, breviter ultra cavos pedicellorum productus, apice et intra cavos furfuraceo-pilosus, ceterum glaber; pedicelli 4-6 mm. longi, glabri; bractea 3-3.5 mm. longa, margine dorsali suberecto oblongo valde concavo conspicue bifido 3-3.5 mm. longo, margine ventrali patelliformi. *Torus* calycecum breviter campanulatus, medio leviter constrictus, 3-3.5 mm. longus. *Calyx* 1.75-2 mm. longus, vix dentatus. *Corolla* (in alabastro tantum visa) 3.5 cm. longa, quinquangula, parte apicali ampliata 4.5 mm. longa; tubus versus basin ampliatus. *Filamenta* 13-14 mm. longa; antherae

cuneatae, 3 mm. longae. *Discus* 0·7 mm. altus. *Stylus* collo 3 mm. longo; stigma peltatum, 3 mm. diametro.—*L. anguliflorus*, Engl. in Engl. Jahrb., vol. xxx. 1901, p. 301, non antea.

TROPICAL AFRICA. German East Africa: Ussangu; Northern Kinga Mountains, on the slopes of Mt. Tyuni, *Goetze*, 1003 (Herb. Berol.).

1358. *Maesobotrya oblonga*, *Hutchinson* in *Dyer*, Fl. Trop. Afr. vol. vi., sect. 1, p. 668, *anglice* [Euphorbiaceae-Phyllanthaeae]; affinis *M. bipindensi*, Pax, foliis oblongis et ovario parce setuloso differt.

*Ramuli* juniores parce hirsuti, teretes. *Folia* oblonga, apice acute triangulari-acuminata, basi rotundata vel subcuneata, 6·5–14 cm. longa, 2·5–4·5 cm. lata, rigide membranacea, integra, utrinque glabra, nervis lateralibus utrinque 8–10 intra marginem anastomosantibus subtus prominentibus, nervis tertiariis laxis; petioli 4–8 mm. longi, parce hirsuti; stipulae lanceolato-subulatae, circiter 2 mm. longae, mox deciduae. *Flores* ♂ non visi. *Racemi* ♀ solitarii, in ramulis foliosis axillares, 9–13 cm. longi; axis dense puberulus; bracteae lineares, pubescentes, 1 mm. longae; pedicelli vix 2 mm. longi, puberuli. *Calycis* lobi 3 vel 4, ovati, apice rotundati, ciliati, parce pubescentes. *Discus* annularis, dense ciliatus. *Ovarium* oblique ovoideum, parce setulosum vel fere glabrum; styli 3, brevissimi, alte bifidi, glabri.

TROPICAL AFRICA. Upper Guinea: Liberia; within 20 miles of Kakatown, *Whyte*.

1359. *Drypetes verrucosa*, *Hutchinson* in *Dyer*, Fl. Trop. Afr. vol. vi., sect. 1, p. 674, *anglice* [Euphorbiaceae-Phyllanthaeae]; affinis *D. lacininatae*, *Hutchinson*, sed stipulis brevioribus, sepalis 5 differt.

*Arbor* 17–22 m. alta; ramuli pubescentes. *Folia* oblongo-elliptica vel lanceolato-elliptica, breviter acuminata, basi rotundata et inaequalia, 12–18 cm. longa, 6–7·5 cm. lata, tenuiter chartacea, spinuloso-dentata, utrinque glabra costa subtus pubescente excepta, supra nitida, subtus pallida, nervis lateralibus utrinque 6–8 patulis intra marginem anastomosantibus supra leviter immersis subtus prominentibus, venis utrinque distinctis; petioli 4–6 mm. longi, verrucosi, puberuli; stipulae laciniatae, circiter 6 mm. longae, segmentis subulatis. *Flores* ♂ non visi. *Flores* ♀ in trunco fasciculati; pedicelli validiusculi, 1·2–2 cm. longi, parce puberuli, demum glabrescentes. *Sepala* 5, suborbicularia, coriacea, utrinque glabra, margine minute ciliolata. *Discus* cupularis, dense tomentosus. *Ovarium* tomentosum, stigmatibus 3 planis adpressis reniformibus circiter 3 mm. latis marginibus crenulatis. *Fructus* ovoidei, integri, fere 4 cm. longi, endocarpio osseo vix 2 mm. crasso intus nitido. *Semina* elongato-ellipsoidea, 2 cm. longa, 0·8 cm. lata; testa nitida, crustacea. *Cyclostemon verrucosus*, *Pierre* ex *Hutchinson*, l.c. 678, nomen.

TROPICAL AFRICA. Lower Guinea: Gaboon; in the neighbourhood of Libreville, *Klaine*, 2382, 2482, 2589.

1360. *Hasskarlia minor*, *Prain* [Euphorbiaceae - Crotonaeae]; species herbacea habitu *Mercurialem perennem*, Linn. simulans, ideoque a speciebus arborescentibus adhuc notis quam maxime distincta.



*Herba* glaberrima, caulibus 3-5 dm. altis, teretibus superne ramosis. *Folia* caulina decussatim opposita, membranacea, breve petiolata, anguste ovata, abrupte longiuscule caudato-acuminata, basi angustata, margine dimidio superiore crebre minute argute serrata, 2.5-3 cm. longa, 1-1.5 cm. lata; petiolus 3-4 mm. longus: stipulae ovatae, membranaceae, deciduae; folia ramulorum inferiora opposita sed manifeste anisophylla, superiora alterna. *Flores* masculi spicati; spicae versus apices ramulorum oppositifoliae, densiflorae, perbreves, 3-7 mm. longae. *Calyx* maris 3-partitus; lobi ovati, valvati. *Stamina* 3, receptaculo affixa, filamentis obsoletis; antherae erectae usque ad basin in locellos 4 demum distinctos erectos subglobosos ab apice dehiscentes divisus. *Ovarii* rudimentum distinctum columnare. *Flores* feminei ignoti.

TROPICAL AFRICA. Upper Guinea: Sierra Leone; Limba, near Bendembu, *Scott Elliot*, 5680.

Except for the presence of a distinct though very short rudimentary ovary the male flowers of this species are exactly like those of *H. didymostemon*, Baill., and *H. oppositifolia*, Pax.

1361. *Tragia* (*Tagira*) *akwapimensis*, *Prain* [Euphorbiaceae-Crotonae]; species *T. Schweinfurthii*, Baker, valde affinis sed foliis apice obtusis, margine minus serratis racemisque masculis longioribus longeque pedunculatis satis distincta.

*Herba*, caulibus suberectis 4.5-6 dm. altis, basi lignosis, valde ramosis, parce puberulis pilisque urentibus paucioribus armatis. *Folia* sessilia vel brevissime petiolata, ascendunt, firmula, lanceolata, apice mucronulata obtusa, basi breve cuneata vel rotundata, margine parce breviter setosa, versus apicem pauci-serrata ceterum integra, 4-5 cm. longa, 8 mm. lata, utrinque secus nervos parcesissime breviter setosa ceterum glabra; petiolus 0-4 mm. longus, parce setosus pilisque urentibus obsitus; stipulae lanceolatae, 2-3 mm. longae, rigidae, reflexae, glabrae vel parce setosae. *Racemi* 1-sexuales, dioici, terminales vel oppositifolii, maris 15-25 cm. longi, pedunculo nudo rhachideque parce puberulo pilisque paucis urentibus obsito 5 cm. longo suffulti; flores numerosissimi, remotiusculi; pedicelli breviter pilosi sub quaque bractea solitarii vel nodis 2-3 inis casu geminati bracteas haud excedentes; bracteae lanceolatae, 2 mm. longae, parce pilosae. *Sepala* maris 3, late ovata, extra parce breviter pilosa. *Stamina* 3; filamenta antheris distincte longiora. *Flores* feminei nondum visi.

TROPICAL AFRICA. Upper Guinea: Gold Coast; Aburi, *J. Anderson*, 54.

Evidently very nearly allied to *T. Schweinfurthii*, Baker, from Dar Fertit, also a dioecious species; the Gold Coast plant is, however, readily distinguished by its obtuse, less serrate and nearly glabrous leaves and by its much longer male racemes.

1362. *Tragia* (*Agirta*) *Baroniana*, *Prain* [Euphorbiaceae-Crotonae]; species *T. Boiviniana*, Muell.-Arg., quam maxime affinis sed foliis subpersisteriter pilosis margine crebre minute dentatis, laciniisque calycis feminei paucioribus margine breviter laciniatis differt.

*Frutex* ramis suberectis lignosis, dense rufo-puberulis. *Folia* brevissime petiolata, membranacea, elliptica, acuta, basi late cuneata vel rotundata, margine minute crebre denticulata, 6-10 cm. longa,

3-4 cm. lata, utrinque adpresse cinereo-pubescentia; petiolus 4-5 mm. longus, dense rufo-puberulus; stipulae lanceolatae, 3 mm. longa, rufo-puberulae. *Racemi* terminales et laterales oppositifolii, 6-10 cm. longi, pedunculo rufo-tomentello 1-2 cm. longo suffulti, supra flores masculos prope basin flores femineos gerentes; flores utriusque sexus fere sessiles sub quaque bractea singuli; bracteae ovato-lanceolatae, acutae, dense puberulae, 1.5-2 mm. longae. *Sepala* maris 3, ovata, subacuta, extra dense pubescentia. *Stamina* 3, centrum floris occupantia; antherae sub anthesin reflexae, horizontales. *Sepala* floris feminei saepius 3, margine breviter utrinsecus pinnatim 6-lobulata, extra dense pubescentia. *Ovarium* dense velutinum; styli 3, basi tantum connati, reflexi. *Capsula* 3-cocca, dense cinereo-pubescentia; cocci subglobosi. *Semina* globosa, brunnea, albo-maculata.

MADAGASCAR. Central Madagascar, *Baron*, 2712.

In spite of the numerous differences between the two, this species and the plant described by Mueller, l.c., as *T. Boiviniana* evidently belong to the same natural section; the stamens in appearance and position are identical in both. Through the kindness of Professor Engler, we have been able to examine a specimen of Hildebrandt, n. 3179 from Nossi-bé, which is identical with Boivin n. 2177/3 from the same locality, on which *T. Boiviniana* was based. Hildebrandt's specimen has ripe fruits. The capsule is 3-coccos, deeply 3-sulcate, 6 mm. across, sparsely beset with weak white bristles. The seeds are globose, pale yellow with small pale brown streaks and blotches.

1363. *Tragia* (*Tagira*) *bongolana*, *Prain* [Euphorbiaceae-Crotonae]; species *T. mitis*, Hochst., proxima a qua differt floribus masculis multo majoribus, pedicellis brevioribus, filamentisque longioribus.

*Herba* caulibus elongatis, volubilibus, parce retrorsim hispida. *Folia* distincte petiolata, firmula, triangulari-ovata, acuta, basi distincte cordata, margine serrata, 5-7.5 cm. longa, 3.5-4 cm. lata, secus nervos utrinque parce hispida, aculeisque perpaucis urentibus obsita; petiolus 2 cm. longus, retrorsim hispida; stipulae lanceolatae, reflexae, marginibus hispidae, 3 mm. longae. *Racemi* caulem ramosque terminantes, 1-sexuales, dioici, ad 10 cm. usque longi, densiusculi, pedunculo nudo retrorsim hispido 0.5-2.5 cm. longo suffulti; pedicelli sub quaque bractea terni, hispidi, bracteis breviores; bracteae ovato-lanceolatae, marginibus hispidae, reflexae, 2 mm. longae. *Sepala* maris 3, late-ovata, obtusa, firmula, glabra. *Stamina* 3; filamenta antheris parum longiora. *Ovarii rudimentum* parvum. *Flores feminei* ignoti.

TROPICAL AFRICA. Nile Land: Bongo; Sablei, *Schweinfurth*, 2729. Mittu; between Karo and Reggo, *Schweinfurth*, 2782.

Most nearly related to *T. mitis*, Hochst., with which it agrees in being dioecious, but differing sufficiently in the points noted above to be considered specifically distinct. *T. mitis*, Hochst., itself also a very distinct species, well discriminated by Richard, has by many authors been confused with *T. cordifolia*, Vahl (*T. cordata*, A. Rich.). The two are readily recognised, because *T. cordifolia* is monoecious, is rather copiously armed with stinging hairs, and has the male flowers mostly solitary to their bracts though they may be casually in pairs near the base of the raceme, whereas *T. mitis* has



no stinging hairs and is always dioecious, the male flowers being in glomerules of three above, and in lax 3-flowered cymules below.

1364. *Tragia* (*Tagira*) *incisifolia*, Prain [Euphorbiaceae-Crotonae]; species *T. minori*, Sond., accedens sed foliis laciniatis, racemis brevioribus, capsulisque minoribus distincta.

*Herba* caulibus nunc brevibus herbaceis e basi lignoso, nunc elongatis prostratis lignosis ramos plurimos herbaceos simplices raro iterum virgatin ramosos emittentibus, caules vel rami herbacei 10–20 cm. longi, virides, parce puberuli vel pubescentes, aculeisque perpaucis albidis armati vel plane inermes. *Folia* sessilia vel fere sessilia, membranacea, ambitu anguste ovata vel ovato-lanceolata, acuta, basi cuneata, margine profunde laciniatim partita, lobis ovato-lanceolatis utrinsecus circiter 4 nunc integris nunc 1-dentatis apicem versus spectantibus; 1–1.5 cm. longa, 0.7 cm. lata, secus nervos supra parce subtile dense aculeis albidis brevibus setosa, laciniis dentibusque marginalibus singulis setam solitariam apicalem suffulcientibus; petiolus 0 vel 1 mm. longus, setosus; stipulae lanceolatae, reflexae, 2 mm. longae, glabrae. *Racemi* terminales, 1–1.5 cm. longi, pedunculis puberulis vel pubescentibus aculeatisque, 0.5–0.7 cm. longis suffulti, floribus masculis pluribus densiuscule aggregatis femineisque basalibus 2–3 onusti; pedicelli utriusque sexus sub quaque bractea solitarii eaque breviores; bracteae ovato-lanceolatae, bracteolaeque ovatae acutae margine setosae ceterum glabrae; bracteae maris 2 mm., feminei 3 mm. longae. *Sepala* maris saepissime 4, nonnunquam 5, raro 3, ovata, acuta, apice incrassata, induplicato-valvata, subcarnosa, glabra. *Stamina* 4–5, raro 3, filamentis antheris fere duplo longioribus. *Sepala* feminei 6, 2-seriata, accrescentia, subcoriacea, alterna ovato-lanceolata et late ovata, latiora utrinsecus 4–5-lobulata, angustiora 3–4-lobulata, extra setosa, intus glabra, lobulis singulis setam singulam terminalem gerentibus. *Ovarium* dense hispidum; styli 3, fere liberi, basi in columnam perbreve tantum connati. *Capsula* 3-cocca, parce setosa, 0.7 cm. lata; cocci subglobosi. *Semina* globosa, pallide cinerea, maculis brunneis notata.

SOUTH AFRICA. Transvaal: between Koomati River Drift and Crocodile River, *Bolus*, 9779; Koomati Poort, on hills at about 300 m. elevation, *Schlechter*, 11,781.

A very distinct species, which cannot be confused with any other African one.

1365. *Tragia* (*Tagira*) *insuavis*, Prain [Euphorbiaceae-Crotonae]; species *T. glabrescenti*, Pax, quam maxime affinis, differt tamen foliis bracteisque multo majoribus, fructu majore, calycisque feminei lobis post anthesin plane pinnatim nec palmatim lobatis.

*Herba* caulibus e basi lignoso suberectis demum volubilibus, junioribus minute puberulis inermibus. *Folia* distincta petiolata, membranacea, ovata vel oblonga, acuta vel breviter acuminata, basi paullo cordata, margine grosse serrata, 5–10 cm. longa, 3–5.5 cm. lata, utrinque secus nervos parcissime pubescentia ceterum glabra; petiolus 2.5–4 cm. longus, minute puberulus pilisque rigidis perpaucis obsitus; stipulae ovato-lanceolatae, extra puberulae, intus glabrae, 2 mm. longae. *Racemi* laterales oppositifolii, 2–2.5 cm. longi, pedunculis puberulis 5–9 mm. longis suffulti, floribus masculis plurimis densiuscule aggregatis femineoque basali singulo onusti; pedicelli utriusque sexus sub quaque bractea solitarii eaque breviores;

bracteae late ovatae, acutae, firmulae, marginibus pubescentes et minute glandulosae, ceterum glabrae; bracteolae bracteis similes nisi minores, bracteae maris 3 mm. feminei 4 mm. longae. *Sepala* maris 3, lutea, orbicularia, glabra. *Stamina* 3, filamentis perbrevibus. *Sepala* feminei 6, 2-seriata, accrescentia sed minopere indurata, 8 mm. longa, pinnatim utrinsecus 5-6-lobulata, rhachide late oblongo-lanceolata, lobulis triangularibus latitudinem rhachidis haud excedentibus, extra rhachideque aculeis albidis parce setosis. *Ovarium* parce hispidum; styli 3, dimidio inferiore in columnam connati. *Capsula* 3-cocca, parce setosa, 1 cm. lata; cocci subglobosi.

TROPICAL AFRICA: Mozambique Dist. German East Africa; Kilimatinde, 1065 m., von Prittwitz.

1366. *Tragia* (*Tagira*) *physocarpa*, Prain [Euphorbiaceae-Crotonaeae]; species e grege *T. cordifoliae*, Vahl, calycis feminei segmentis elongatis longissime lobulatis capsulaque pro genere maxima insignis.

*Herba* vel *suffrutex* caulibus erectis lignosis e basi lignoso ortis, sursum valde ramosis, ramis elongatis gracilibus herbaceis deorsum strictis sursum volubilibus, minute pubescentibus, inermibus. *Folia* distincte petiolata, membranacea, pallide viridia, ovato-triangularia, acuminata, basi distincte cordata, margine distincte serrata, 5-6 cm. longa, 2-2.5 cm. lata, supra secus nervos parce pubescentia et parvissime aculeata, subtus secus nervos densiuscule aculeata; petiolus 2-2.5 cm. longus, minute pubescens, inermis; stipulae lanceolatae, erectae, puberulae, 3 mm. longae. *Racemi* laterales oppositifolii, 5 cm. longi, pedunculo nudo puberulo parceque aculeato 2-2.5 cm. longo suffulti, floribus numerosis laxis masculis supra et femineis basalibus saepius 2 onusti; pedicelli sub quaque bractea singuli eaque breviores; bracteae tenue membranaceae, maris 2 mm. longae, anguste lanceolatae, reflexae, parce pubescentes, feminei ovato-lanceolatae, 4-5 mm. longae, distincte utrinsecus 1-3 dentatae, bracteolae bracteis similes nisi minores, integrae vel utrinsecus 1-2-dentatae. *Sepala* maris 3, oblonga, subacuta, extra puberula. *Stamina* 3; filamenta perbrevia. *Sepala* feminei 6, 2-seriata, oblonga, valde accrescentia nec tamen indurata, tandem 1.5 cm. longa, pinnatim utrinsecus 4-lobulata; lobuli adscendentes anguste lanceolati 8 mm. longi, rhachideque pubescentes marginibusque dense aculeolati. *Ovarium* fere glabrum; styli 3, basi in columnam brevem connati. *Capsula* 3-cocca, parce albido-aculeolata, valvis tenue coriacea, 1.8 cm. lata.

TROPICAL AFRICA. Lower Guinea: German South-west Africa; Owambo, at Otavi, Dinter, 753.

1367. *Tragia* (*Tagira*) *Rogersii*, Prain [Euphorbiaceae-Crotonaeae]; species *T. lukafuensi*, De Wild., habitu congruens, sed foliis inermibus basi rotundatis vel subtruncatis nec subhastato-auriculatis differt.

*Caules* numerosi e basi lignoso erecti, caespitosi, vix ramosi, 20 cm. alti, laxiuscule molliter pubescentes, inermes. *Folia* sessilia, ascendunt, membranacea, ovato-lanceolata vel oblongo-lanceolata, acuta, basi truncata vel rotundata, margine nisi basi integro minute crebre serrata, 3-3.5 cm. longa, 1 cm. lata, supra parce subtus praesertim secus nervos densiuscule molliter pubescentes; petioli 0; stipulae lineari-lanceolatae, patentes, membranaceae, 2 mm. longae, margine ciliolatae, ceterum glabrae. *Racemi* 1-sexuales, dioici,

terminales vel oppositifolii, masculi saepissime 5-7 cm. nonnunquam usque ad 16 cm. longi, pedunculo molliter pubescente vix 1 cm. longo suffulti, flores numerosissimos versus basin in cymulas 3-floras inter se 1-1.5 cm. remotas, versus apicem in glomerulos 3-floros 0.5 cm. remotos dispositos gerentes; pedicelli pubescentes bracteis bracteolisque breviores, bractee lineari-lanceolatae 1.5-2 mm. longae, bracteolae similes 0.5 mm. longae, margine pilosae, ceterum glabrae. *Sepala* maris ad normam 3, nonnunquam 4, raro 6, ovata vel ovato-lanceolata, acuta, intus parce puberula, extra parce pubescentia. *Stamina* 3; filamenta antheris longiora, basi explanata versus apicem incurva, antherae plane conniventes. *Flores* feminei ignoti.

**SOUTH AFRICA.** Transvaal: Waterval, *Rogers* (Transvaal Mus. Herb. 2597).

While so closely resembling in general habit and appearance the Lukafu plant described by Professor De Wildeman, this is clearly, from the shape of its leaves and the absence of stinging hairs, specifically distinct from *T. lukafuensis* and until the female flowers of both are known it would be rash to hazard the suggestion that they are closely allied; the probability indeed is that while *T. lukafuensis* belongs to the group which includes *T. Benthumi*, Baker, and *T. Okanyua*, Pax, the species now described belongs rather to the group which includes *T. rupestris*, Sond., and its ally *T. minor*, Sond. It is to be remarked that whereas in *Tragia* it is not unusual for male flowers to have casually four or even five stamens, but much rarer to find more than three calyx-lobes, in *T. Rogersii* the number of calyx-lobes frequently exceeds three, but that even when there are as many as six calyx-lobes, the number of stamens does not exceed three.

1368. *Tragia* (*Tagira*) *shirensis*, *Prain* [Euphorbiaceae-Crotoneae]: species *T. Okanyua*, Pax, proxime accedens, differt foliis fere sessilibus basi haud auriculato-cordatis, pedicellis masculis longioribus, filamentis longioribus et calycis feminei segmentis difformibus.

*Herba* caulibus erectis crassiusculis e basi lignoso ortis, 30-45 cm. altis, plus minusve ramosis, densius pilis patentibus hispidis parceque aculeis urentibus armatis. *Folia* sessilia vel brevissime petiolata, ascendentia, membranacea, lineari-lanceolata, acuminata, basi breviter cuneata vel rotundata, margine crebre argute serrata, 5-8 cm. longa, 6-8 mm. lata, supra secus nervos strigosa, subtus secus nervos densius strigosa aculeisque urentibus obsita; petiolus 0-2 mm. longus, strigosus aculeatusque; stipulae lanceolatae, rigidiusculae, patentes, margine setosae, 3 mm. longae. *Racemi* androgyni, terminales, 2.5-8 cm. longi, pedunculo nudo strigoso 0.6-1.7 cm. longo suffulti, flores masculos plures cum 2-3 basalibus femineis gerentes; pedicelli filiformes parce pilosi, omnes bracteas excedentes, masculi terni, feminei solitarii; bractee lanceolatae, membranaceae, margine setosae, 2 mm. longae. ♂ *Sepala* 3, ovata, acuta, extra parce pilosa. *Stamina* 3; filamenta antheris longiora. ♀ *Sepala* 6, 2-seriata, difformia, extra parce pilosa, demum accrescentia, coriacea, 3 exteriora ovata pinnatim utrinsecus 3-4-lobulata, lobulis brevibus ovatis acutis, 3 interiora palmatim divisa lobo centrali erecto oblongo-lanceolato margine integro lobulis basalibus lanceolatis reflexis patentibus. *Ovarium* parce hispidum et setosum; styli 3, ultra medium in columnam crassiusculam parce



setosam connati. *Capsula* 3-cocca, parce setosa, 1.25 cm. lata; cocci dorso obtuse angulati. *Semina* globosa.

TROPICAL AFRICA. Mozambique Dist. Nyassaland: Shire Highlands, near Blantyre, *Last*.

1369. *Plukenetia* (*Hedraistylus*) *procumbens*, *Prain* [Euphorbiaceae-Crotoneae]; species a ceteris sectionis *Hedraistyli* habitu prostrato, foliis basi late rotundatis nec cordatis nec auriculatim lobatis petiolisque perbrevibus facillime distinguenda.

*Herba*; caules sat numerosi e basi lignoso orti, crassiusculi, subcomplanati, procumbentes, diffuse ramosi, dense persistenter scabridiusculi. *Folia* subsessilia, firmula, subtus purpurascentia, late ovata, acuta, basi rotundata, margine nisi basi integro sat crebre acute serrata, 3-4.5 cm. longa, 2-3 cm. lata, basi manifeste 3-nervia, nervulis 2 marginalibus pergracilibus additis, supra saturate viridia, nitida, sub lente albido-punctata, subtus pallidiora, epunctata, utrinque secus nervos breviter scabridula, ceterum glabra; petiolus perbrevis, 2-3 mm. longus, scabridulus; stipulae lineares, minutae. *Racemi* simplices, terminales, 2.5-5 cm. longi; flores masculi pauci, feminei solitarii sub-basales; bractee anguste lanceolatae; pedicelli utriusque sexus sub quaque bractea singuli, articulati. *Calyx* maris oblongus, glaber, valvatim 4-lobus; lobi lanceolati. *Stamina* circiter 12; filamenta brevissima; antherae subglobosae, loculis connectivo omnino adnatis. *Calyx* feminei glaber, 4-lobus; lobi ovati, acuti, imbricati. *Discus* 0. *Ovarium* dense strigosum, 4-loculare; ovula in quoque loculo solitaria; stylus crassus ovario subaequilongus, glaber, stigmatibus 4 oblongis cruciformiter patentibus minute papillosis coronatis. *Capsula* juvenilis 4-coccus; cocci dorso in alam explanati. *Semina* ignota.

TROPICAL AFRICA. Lower Guinea. Angola: Benguella; Ganguella, on the Cubango river at Princeza Amelia, 1520 m., *Gossweiler*, 2540.

1370. *Carex* (Pseudo-cypereae) *congolensis*, *Turrill* [Cyperaceae-Caricoideae]; ab affini *C. cognata*, Kunth, utriculis brunneis, nucibus stramineis oblongo-ellipticis differt.

*Culmi* robustiores, ad 4 dm. alti, apice concavi, trigoni, glabri. *Folia* ad 4 dm. longa et 5 mm. lata, apice acutissima, in marginibus minute scabra, vaginis (et foliis inferioribus) transversim lineolatis. *Spicae* 5-7-fastigiatae, fere sessiles, nisi ima remotiuscula pedunculo 3 cm. longo suffulta, 1-2 superiores ♂, lineari-oblongae, ad 4 cm. longae, reliquae cylindricae, 3-5 cm. longae, 0.75 cm. latae, densiflorae. *Bractee* foliaceae, inflorescentiam superantes, usque ad 2 dm. longae. *Squamae* longe aristatae, in parte superiore et arista scabrae, dorso costa viridi excepta pallide ferrugineae; ♂ anguste obovatae, 6 mm. longae (arista inclusa), 1.5 mm. latae; ♀ lineari-oblongae, 4 mm. longae (arista inclusa), 1 mm. latae. *Utriculi* 4 mm. longi (rostrum incluso), 1.5 mm. diametro, ellipsoidei, basi angustati, valide 12-nervati, brunnei, in rostrum laeve 1 mm. longum ore rigide et breviter bidentatum contracti. *Nux* laxè inclusa 2.3 mm. longa, 1 mm. diametro, oblongo-ellipsoidea, trigona, faciebus concavis, straminea. *Stylus* basi tortuosus. *Stigmata* 3.

TROPICAL AFRICA. South Central. Congo State: Katanga; Elisabethville, Lat. 11° 37' S., Long. 27° 24' E., 1150 m. Oct. 21, 1911. *F. A. Rogers*, 10,082.

## XXVII.—TULIP WOODS AND TULIP TREES.

W. DALLIMORE.

Although the application of the same common name to several different kinds of woods must be misleading to persons engaged in the timber trade, it is of frequent occurrence, and the numerous kinds of gum, rosewood, cedar, pine and mahogany which are put upon the market may be cited as examples.

Tulipwood is another instance of the indiscriminate way in which the same name is applied to several woods which are quite distinct in character. A further complication is caused by other trees being known as tulip trees although their wood is not recognised as tulipwood.

In the "Diplomatic and Consular Report," No. 4818, which deals with the trade and commerce between France and French Guiana, it is stated that the wood of *Licaria guianensis*, (*Dicypellium caryophyllatum*), is known in England as tulipwood and in France as rosewood. This suggested that a compilation of the several timbers and trees to which the terms tulipwood and tulip tree are applied might be of value and the following list has been drawn up.

The term tulipwood appears to be associated with at least seven different kinds of trees. Two of these, *Harpullia pendula*, Planch., and *Physocalymma scaberrimum*, Pohl, are in regular use in the cabinet trade; the others, *Atalaya hemiglaucæ*, F. Muell., *Dicypellium caryophyllatum*, Nees., *Stenocarpus sinuatus*, Endl., *Owenia venosa*, F. Muell., and *Aphananthe philippinensis*, Planch., are less well known.

*Harpullia pendula*, Planch.—This Sapindaceous tree is found in the forests of New South Wales and Queensland, where it grows from 40 to 60 feet high with a trunk 12 to 24 inches in diameter. Its leaves are made up of from three to six, rarely more, ovate or oblong leaflets, and its small flowers, borne in loose panicles, are succeeded by winged fruits. The wood is tough, close-grained and beautifully marked with different shades of yellow, brown and black. The colour, however, appears to depend to some extent on soil or climatic conditions, for Maiden reports (Bulletin Dorrigo Forest Reserve), that samples of wood from the Bellinger and Dorrigo regions are less handsomely marked than others from the Richmond River and farther north. A plank specimen at Kew which measures  $16\frac{1}{2}$  inches in width, shows 7 inches of yellowish sapwood and  $9\frac{1}{2}$  inches of dark, prettily-marked heartwood. The wood is used for cabinet-making, furniture, panels for doors, &c. The same author in "Notes on the Commercial Timbers of New South Wales," refers to its use for billiard tables, and in "Useful Native Plants of Australia," to its being the best wood in Australia for lithographers' scrapers, and suggests a probable value for engraving.

Examples of the wood are to be seen in Museums Nos. 1 and 3 at Kew, and in the latter building, a table top partly made of this wood gives a good idea of its value for the manufacture of high-class furniture.

*Physocalymma scaberrimum*, Pohl.—The genus *Physocalymma* belongs to the Natural Order *Lythraceæ* and is closely allied to the

genus *Lagerstroemia*. *P. scaberrimum* possesses the peculiarity so prevalent amongst the species of *Lagerstroemia* of being a highly ornamental flowering tree. It occurs in Brazil as a small deciduous tree 20 to 30 feet high with a trunk 18 inches in diameter. The ovate or broadly oval leaves are 3 to 4 inches long and 2 to 2½ inches wide, but in the variety *angustifolium* they are rather longer and narrower. Flowering occurs a few weeks before the young leaves expand, the red flowers appearing in large panicles from the ends of the branches.

The wood, as represented in Museum No. 1, at Kew, is heavy, close-grained, and red and yellowish-brown in colour when newly cut, the markings being of a curiously streaky character. There is, apparently, a strong disposition for the colour to fade, for the outer parts of old sections are various shades of brown. It takes a good polish and is used for cabinet work and for small fancy articles.

Descriptions of *P. scaberrimum* are given by Martius in the "Flora Brasiliensis," xiii, pt. 2, p. 343, and by Pohl in "Plants of Brazil," i, pp. 100-101, tt. 82-83.

*Atalaya hemiglauc*a, *F. Muell.*—The wood of this Australian tree is known as western whitewood or western tulipwood, but it does not appear to be of much commercial importance. It is one of the *Sapindaceae* and occurs as a tall shrub or small tree in various parts of N. Australia, Queensland, and New South Wales. It is of interest owing to the diverse character of the leaves, which are sometimes pinnate and composed of an irregular number of linear leaflets, varying in length from 2 to 3 to 7 to 8 inches, sometimes simple and deeply lobed, or almost entire and up to 10 inches long, but it is not considered to be of much decorative value, for the flowers are small and the maple-like fruits have no special attractions.

Examples of the wood are not included in the Kew collection, but Maiden, "Forest Flora of New South Wales," ii, pp. 122-124, describes it as having light red sapwood and heartwood marked with dark red, or nearly black, patches or streaks. In other places the wood is described as yellowish with reddish marks. It is said to be close-grained, decaying easily, and though used to some extent for cabinet-work and turnery, to be of little value.

A useful pale-coloured gum, differing very little from purest gum Arabic, exudes from the tree, which Maiden, "Forest Flora of New South Wales," ii, p. 123, says would be an important article of commerce if obtainable in quantity.

*Atalaya hemiglauc*a is planted as a shade tree, but its greatest economic importance lies in the fact of its leaves providing an important food for cattle and sheep in times of drought. From this it is sometimes called the "cattle bush."

*Dicypellium caryophyllatum*, *Nees*.—Descriptions of this tree appear in several works, notably Nees ab Esenbeck, *Systema Laurinarum* (1836), pp. 344-345; Martius, *Flora Brasiliensis*, v, pt. 2, p. 281, t. 102; and Aublet, *Historie des Plantes de La Guiane Francaise* (1775), i, p. 313, iii, t. 121. In the latter work the description appears under the name of *Licaria guianensis*. The plant is poorly represented at Kew, for the herbarium specimens are contained on one sheet and the museum material is limited to a



sample of bark. From what can be learnt of the tree it is plentiful in the Guianas and in Brazil, where it attains a height of 50 or 60 feet, with a trunk 3 feet or more in diameter with reddish, corrugated bark and strong, close-grained wood. It is a member of the *Lauraceae*, and possesses a character which is noticeable in many other plants belonging to the order, namely, that wood, leaves and bark are fragrant. Owing to its scented wood it has been given the common name of "bois de rose." It has also been called "Cayenne Sassafras."

A strong clove-like scent is present in the bark and for this reason it is known as "clove-bark" and "Brazilian clove-bark." The taste of the bark strongly resembles that of cloves, and powerful tonic properties are attributed to it. An essential oil, known as "clove-bark oil," which bears a strong resemblance in all its properties to "clove-oil," is obtained from the bark by aqueous distillation. It is used in perfumery, &c. (see Spon's "Encyclopaedia of the Industrial Arts," p. 1420; "The Volatile Oils," by E. Gildemeister and Fr. Hoffmann (1900), p. 393; "Odorographia," by J. Ch. Sawer (1892), p. 231, and (1894), p. 39).

Very little appears to have been written about the wood, and its importation into Europe seems to have begun quite recently. Although frequently mentioned as rosewood, the only reference to it as tulipwood which has been found is the one referred to in the "Diplomatic and Consular Report" previously mentioned.

Judging from the appended extract, the timber and oil of *Dicypellium caryophyllatum* are fast becoming important articles of commerce, and as there seems to be a disposition at the present time to exploit the forests of Brazil, it is quite probable that the trade in these products will undergo further developments.

Extract from "Diplomatic and Consular Report," No. 4818, Ann. Ser. France. Trade and Commerce of French Guiana.

"Rosewood (*Licaria guianensis*) [*Dicypellium caryophyllatum*], known in England as tulipwood.

"Since 1902 every report has mentioned an increase in this export. The year 1910 shows an export of 1262 tons, valued at 94,628 fr., against 2018 fr. in 1908 and 19,875 fr. in 1909, thus showing an increase of 74,753 fr. on 1909. The entire export was to Grasse (Alpes Maritimes), France. The wood is sold at 100 and 150 fr. per ton (locally).

"Essence of Rosewood.—Besides the export of wood, seven factories are now established for the extraction of the essence, which is shipped to France in carboys. The average product of one ton of wood is 22 lbs. of essence, the price in France being about 10s. per lb.

"The total export of this essence was :—

				Kilos.	Francs.
1908	...	...	...	7,470	186,750
1909	...	...	...	12,497	312,400
1910	...	...	...	22,066	551,650

Increase in 1910 ... .. 239,250 "

*Owenia venosa*, F. Muell.—This is an Australian tree, growing 30 to 40 feet high with a trunk 12 to 18 inches in diameter, belonging

to *Meliaceae*. The wood, as shown in Museum No. 1 at Kew, is reddish in colour, hard and close-grained. It is said to be easy to work, and to be useful for furniture and for wheelwrights' work. A reference to it as tulipwood will be found in Maiden's "Useful Native Plants of Australia," p. 581.

*Aphananthe philippinensis*, *Planch.*—A description of this tree occurs in the "Forest Flora of New South Wales," ii, pp. 71-73, and reference to it as tulipwood is made in "Useful Native Plants of Australia," p. 376. It is one of the *Urticaceae*, and forms a medium-sized tree with small, elm-like leaves; it attains a height of 50 to 70 feet with a trunk up to 4 feet in diameter, and is met with in the Island of Luzon, New South Wales, and Queensland. The wood, as represented in Museum No. 1 at Kew, is yellowish in colour, close-grained, and rather prettily marked. Maiden reports it as being used for turnery, linings, and ceilings, but to be in bad repute for durability.

*Stenocarpus sinuatus*, *Endl.*—In Museum No. 1 at Kew a specimen of the wood of this Proteaceous tree is shown under the common name of tulipwood, the name of tulip tree occurring in "Useful Native Plants of Australia," p. 600. The wood is described as nicely marked, close-grained, hard, durable, and admitting of a good polish. It is used for staves, veneers, and cabinet work. The tree grows 60 to 70 feet high, with a trunk 2 feet in diameter.

The name of Tulip Tree is given to at least four different kinds of trees, one belonging to *Magnoliaceae*, and the other three to *Malvaceae*.

*Liriodendron Tulipifera*, *L.*—This well-known Magnoliaceous tree, to which reference was made in the *Kew Bulletin*, No. 5, 1911, p. 214, is the most familiar tulip tree in temperate regions. It is a native of the United States, and its timber holds an important place amongst commercial woods. Instead of being called tulipwood, however, it is known under a variety of names, such as white poplar, yellow poplar, whitewood, canary whitewood, basswood, &c.

*Lagunaria Patersoni*, *D. Don.*—In the "Forest Flora of New South Wales," i, pp. 113-115, Maiden describes this species as the she oak or tulip tree of Australia. It inhabits Norfolk Island and the coast region of Queensland, where it forms a spreading tree 40 feet high, with large showy flowers. The wood is said to be soft and valueless, having little to recommend it even for firewood. The chief value of the plant lies in its decorative character and its ability to withstand a salty air and a humid climate. For this reason it is chosen for street planting in some coastal towns in Australia.

*Thespesia populnea*, *Sol.*—This is a small Malvaceous tree found in Tropical Asia and Africa. W. A. Talbot describes it under the common name of tulip tree in the "Forest Flora of Bombay," i, (1909), and it is referred to under the same name by Brandis, "Indian Trees," p. 75. It forms a small, decorative tree, and bears evergreen, ovate leaves up to 7 inches long and 4 inches across, and large, showy, yellow and purple flowers. The wood is fairly strong and heavy, fine-grained, with light-coloured soft sapwood and hard,

red heartwood. It is used for gun-stocks, wheel-spokes, boat-timber, carts, and furniture. The bark yields a good fibre, and the capsules a yellow dye like gamboge. Both bark and wood contain tannin. A further description of the wood may be obtained from Gamble's "Manual of Indian Timbers," p. 88.

*Hibiscus elatus*, Sw.—This is known by the two common names of "blue mahoe" and "tulip tree." Stone, "Timbers of Commerce," p. 9, describes the wood as having a faint, aromatic or peppery scent, giving rise to sneezing when worked. It is used for gun-stocks, carriage poles, ships' knees, and fishing rods on account of its flexible character, and is compared to European ash, but is said to be more durable and longer in the fibre than that timber.

## XXVIII.—MISCELLANEOUS NOTES.

EDUARD STRASBURGER.—The news of the sudden death from heart failure of Professor Eduard Strasburger, in the night of the 19th of May, will have come with a great shock to all his friends and admirers. Nothing was known at Kew of any ailment having overtaken him, and when he paid his last visit to the Royal Botanic Gardens a very few years ago he seemed still to be in his usual good health and full of vigour and rare mental activity. He was in his 69th year, and his friends had just began to prepare for a fitting celebration of the 70th anniversary of his birthday by the publication of a "Festschrift" or jubilee volume, with contributions from his colleagues and pupils.

It is not intended in this place to deal in detail with Strasburger's achievements in the fields of botanical histology, morphology and cytology, the latter a discipline of which he was really the founder. His claims in those directions are recognised all over the world. Pathfinder, teacher and worker of the first order, he has opened out new roads and set up along them many a markstone that will endure. Pupils flocked to him from all countries, and not the least from England and America. It was not very many years ago that he came to this country on a long holiday to improve his practical knowledge of English so that he might be the better able to converse with those of his students whose linguistic facilities were confined to that language. At that time, and on other occasions, he was an enthusiastic visitor and admirer of the Royal Botanic Gardens and their treasures which his keen eye was quick to discover. He was never tired to point out the precious opportunities which await there the botanist who will avail himself of the hospitality of the establishment. He himself had not the time to settle down at Kew for research work, but he drew repeatedly on the resources of the Gardens and the Herbarium during a period of more than 35 years, the last time in connection with his studies on sexual and apogamous reproduction in *Urticaceae*.

He was not only a great man of science, but also a man of unusual breadth of thought and universal culture. No one has written more beautifully about the glories of the Riviera; and fascinating and stimulating as he appears to us in the "Rambles on the Riviera" so he was also in conversation, charming, many-sided and refined.



Strasburger was born in Warschau in 1844. He studied in Bonn and under Häckel in Jena, was appointed Professor of Botany and Director of the Botanic Garden at Jena in 1869, and went to Bonn in 1881, where, in the old Castle of Popplesdorf, he founded those laboratories which soon became a centre of active histological and cytological research. He was awarded the great Gold Medal of the Linnean Society in 1905, and in 1908 was one of the seven recipients of the Darwin-Wallace Medal, bestowed by the same Society on the occasion of the Darwin-Wallace celebration, the others being Wallace, Hooker, Häckel, Weissman, Galton and Ray Lankester.

O. S.

**Two Interesting Euphorbias.**—The accompanying Plate illustrates two fine specimens of *Euphorbia Caput-medusae*, Linn., and *E. multiceps*, Berger, which have recently been presented to the Royal Botanic Gardens, Kew.

The plant of *Euphorbia Caput-medusae*, Linn., was collected on the slopes of Lion's Head Mountain, near Cape Town, by Mr. Eustace Pillans, and sent to Kew in December last. The specimen is 18 inches in diameter and consists of a globose main body about 6 inches in diameter, covered, except at the very centre, with numerous crowded cylindric branches; these in different individuals, vary from 2 to 15 inches long and  $\frac{2}{3}$  to 1 inch thick, and are covered with obliquely conical tubercles. The flowers are clustered at the tips of the branches and are about  $\frac{1}{2}$  inch in diameter, with 5 palmately-divided green and white glands and 5 incurved reddish lobes.

According to Mr. Alwin Berger this plant is not uncommon on the Continent, but no plant of it has been cultivated at Kew nor in any collection I happen to have seen during the past 39 years. A beautiful photograph of it growing wild is reproduced by Dr. Marloth in *Wissensch. Ergebn. Deutsch. Tiefsee-Exped.* vol. 2, pt. 3, t. 9, but the figure here given is the first and only one that has appeared in an English book giving a correct representation of the entire plant.

Very few plants have been more misunderstood than this, for when the species was founded by Linnaeus, according to the references he quotes, five or six distinct species were included under it and the varieties he made. In gardens also several species have been erroneously cultivated under the name of *E. Caput-medusae*. There is no specimen preserved in the Linnean Herbarium to prove which was Linnaeus' type, but, as he appears to have seen it growing in Clifford's garden, the cultivated plant would most probably be one found growing near Cape Town. The species here figured is the only one which grows around Cape Town to which the name and description could apply, and as it is recognised there as being *E. Caput-medusae*, it will be accepted as such for the *Flora Capensis*. Berger in his "*Sukkulente Euphorbien*," p. 110, has taken the same view of this species, whilst almost all other authors have mistaken other species for it or confused others with it.

*Euphorbia multiceps*, Berger, is one of the most remarkable species in the genus, being quite unlike any other *Euphorbia* or indeed any



EUPHORBIA CAPUT-MEDUSAE.

[To face page 246.



EUPHORBIA MULTICEPS.

*To face page 247.]*



other known succulent plant. In rough comparison it may be likened to a green pine-apple with a number of spikes irregularly protruding from it. In structure it consists of a stout conical fleshy axis densely covered from the base nearly to the apex with short cylindric horizontally spreading branches, forming a conical mass varying from 3 inches to 2 feet in height and 3 to 10 inches in diameter at the base, according to age. From between the branches of younger plants, and from the tips of them also in old plants, arise the stout spine-like processes seen in the figure, which are really barren peduncles. Flowers have not been seen.

Although so different from *E. Caput-medusae* in appearance, *E. multiceps* is only a modification of the same type of structure. In the former the main axis does not elongate so fast as its branches, which therefore becomes 2-3 times as long as the main axis is high and spread out on all sides, forming a convex cushion-like mass. Whilst in the latter the main axis elongates much faster than its branches, which are always many times shorter than it, thus forming a conical mass.

*E. multiceps* is a native of South Africa, where it grows in the Karoo region around Matjesfontein and in little Namaqualand.

The plant represented in the photograph was received from Prof. H. H. W. Pearson in March, 1911, and was collected by him during the Percy Sladen Expedition in Namaqualand.

N. E. B.

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**Presentations to Museums.**—The following miscellaneous specimens have been received in addition to those previously recorded in the Bulletin :—

Lochiel, Achnacarry, Inverness.—Transverse sections of wood of Larch and Oak.

Messrs. Dring and Fage, Stamford Street, London, S.E.—A collection of scientific Instruments used in Forestry.

Mr. James Whitton, Superintendent of Parks, Glasgow.—Sections of wood of *Abies concolor*, *A. Nordmanniana*, *A. nobilis*, *Picea sitchensis*, *Betula alba*, and *Ulmus campestris*.

Mr. W. W. Courtenay, Richmond, Surrey.—Section of stem of *Prunus domestica*, infested with *Stereum purpureum*.

Mr. M. T. Dawe, Mozambique.—Sliced tubers of Wild Yam (*Dioscorea* sp.).

Mr. V. F. Leese, Parkend, Gloucester.—Sections of Larch and Oak.

Messrs. Wigglesworth & Co., Fenchurch Street, London, E.C.—Sample of Sisal Hemp (*Agave rigida*, var. *sisalana*), from British East Africa.

Mr. H. R. A. Mallock, F.R.S., London, S.W.—Photographs of Branching Date Palms from Tenerife.

Mr. F. A. Stockdale, Botanic Gardens, Demerara.—Photographs of Coco de Mer (*Lodoicea sechellarum*).

Mr. R. C. Notcutt, Woodbridge.—Section of trunk and a plank of Corsican Pine (*Pinus Laricio*).

Mr. Stuart R. Cope, Westminster.—Seeds of *Manihot heptaphylla*.

Messrs. English Bros., Ltd., Wisbech.—Models of a Gate and Fencing in creosoted wood.

Lady Hooker, The Camp, Sunningdale.—Basket made by Fraser River Indians, British Columbia.

Mr. Leonard Cockayne, Christchurch, New Zealand.—Portion of plant of *Helichrysum coralloides*, found growing on dry rock at an altitude of 1500 m. on Shingly Range, Awatere, Marlborough, New Zealand.

Messrs. Cockarill Bros., Richmond.—Dart-board made of Elm.

Mr. Rex W. Brent, Forestry Department, Gold Coast.—A collection of fruits, seeds, &c., from the Gold Coast.

J. M. H.

Botanical Magazine for May.—The plants figured are *Davidia involucrata*, Baill., var. *Vilmoriniana*, Hemsl. (t. 8432); *Iris chrysographes*, Dykes (t. 8433); *Saxifraga lingulata*, Bellardi (t. 8434); *Hypocalymma robustum*, Lindl. (t. 8435) and *Calceolaria Forgetii*, Skan (t. 8436).

The *Davidia* is a medium-sized tree with linden-like foliage and large white leafy bracts borne in pairs beneath each head of flowers. It is a native of Central and Western China, and was first introduced into Europe in 1897, when Père Farges sent seeds to Messrs. Vilmorin of Paris. The solitary plant raised from these seeds flowered for the first time in the collection of Mr. M. L. de Vilmorin at Les Barres, Loiret, in 1906, and it was from this plant that the material for the figure was obtained, the fruiting specimen having been sent by Mr. Vilmorin in October 1908, and flowering specimens in May 1911. Père Farges sent home a further batch of seeds in 1898, and in 1899 Messrs. J. Veitch & Sons received a very large supply from their collector Mr. E. H. Wilson. Messrs. Veitch raised a great number of plants at their Coombe Wood nursery and one flowered there, for the first time in England, in May 1911. The variety figured, regarded by Mr. L. A. Dode as a distinct species, merely differs from the type by the absence of the white tomentum on the underside of the leaves.

*Iris chrysographes* was originally described last year from a specimen which flowered in Mr. W. R. Dykes' garden at Godalming. Mr. Dykes' plant was obtained as a seedling from Miss Willmott, in whose garden at Warley Place, Essex, it had been raised from seeds collected by Mr. E. H. Wilson in Western Szechuan. The species belongs to the section which includes *I. sibirica*, Linn. and is remarkable for its rich dark purple flowers of a velvety texture. The plant from which the material for the figure was obtained was grown by Mr. Dykes.

The handsome *Saxifraga lingulata*, a native of the Maritime Alps, has been cultivated at Kew for many years, where it is quite hardy, but owing to the impurities of the local atmosphere it is found that in order to secure the best development of the inflorescences the plants must receive the protection of a frame.

*Hypocalymma robustum* is a West Australian shrub belonging to the Myrtaceae, and half a century ago was often met with in English conservatories. In well-favoured localities it flourishes in a sheltered position out-of-doors, and from one of these, namely the garden of the late Mr. Gumbleton at Belgrove, Queenstown, the

material for the figure was sent. The species which constitute the genus *Hypocalymma* were formerly included in *Leptospermum*.

The *Calceolaria* is a pretty Peruvian species which has been introduced into cultivation by Messrs. Sander & Sons, who received seeds from Mr. Forget. It was at first identified with *C. virgata*, Ruiz and Pav., an imperfectly known species, but which, judging from a rather poor figure and description, differs in leaves and flowers from *C. Forgetii*. This is a free-flowering plant for the greenhouse or a sunny border. At Kew it has not proved hardy.

**Botanical Magazine for June.**—The plants figured are *Brachychiton acerifolius*, F. Muell (t. 8437); *Rupicola sprengelioides*, Maiden (t. 8438); *Ixora lutea*, Hutchinson (t. 8439); *Lycium pallidum*, Miers (t. 8440); and *Perovskia atriplicifolia*, Benth. (t. 8441).

The *Brachychiton* (often called *Sterculia acerifolia*) is a native of New South Wales and of Queensland, and is the familiar Flame Tree of the colonists. It is a tall tree, sometimes attaining a height of 120 feet, and has a soft light-coloured wood of coarse grain. The flowers, which are produced in large lax axillary panicles, are pendulous, bright pink, and very attractive. The species was first introduced into England in 1824, and a plant reached Kew in 1825. The material for the illustration was obtained from a plant, now about 40 feet high, which was presented to the collection by Messrs. James Veitch & Sons in 1862. This flowered for the first time in June, 1910.

*Rupicola sprengelioides*, an Epacrid, was discovered in the Blue Mountains of New South Wales, by Messrs. J. H. Maiden and W. Forsyth, in 1898, and the specimen figured was procured from a plant raised from seeds sent to Kew by Mr. Maiden in 1906. It is a small shrub with densely leafy branches, linear-lanceolate leaves, and axillary solitary milky-white flowers about  $\frac{1}{3}$  inch long.

*Ixora lutea* is supposed to be of garden origin. Under the name of *Ixora coccinea* var. *lutea* it originally reached Kew about twenty years ago from the Royal Botanic Garden, Peradeniya, Ceylon. From the well-known *Ixora coccinea* it is easily distinguished by its laxer inflorescence, pale yellow flowers, and by its larger ovate-rhomboid corolla-lobes. Like several others of the genus, *I. lutea* is a valuable warm-house flowering plant.

The *Lycium* is described as the most effective species in cultivation. It is a native of the Southern United States and Northern Mexico, the form figured, which has been grown in the open at Kew since 1886, being from Colorado, and is distinguished from the New Mexican form by having the corolla-tube hairy inside below the insertion of the stamens instead of being quite glabrous. This species has pale greenish-yellow or almost white flowers about  $\frac{3}{4}$  inch long, and red globose berries  $\frac{1}{4}$ – $\frac{1}{3}$  inch across.

*Perovskia* (often called *Perowskia*) is a somewhat anomalous genus of Labiatae comprising four species, natives of Central Asia, North-western India and Western Tibet. *P. atriplicifolia* is found in the mountains of Afghanistan and extends through the Western Himalaya to Western Tibet. It is a shrub, 3 to 5 feet high, with a paniculate inflorescence of rather small blue flowers. The plant which furnished the material figured was obtained from Messrs. Bees, Ltd., in 1906.



**Forestry in South Africa.**—The Report of the Conservator of Forests for the Union of South Africa for the year ending December 31st, 1910, has been received recently. It consists of 30 pages of letterpress and 12 of illustrations, and deals with the general management and work of the Department, making special reference to plantations formed for the supply of railway sleepers.

The chief items discussed are.—Extension and Constitution of State Forests ; Forest Settlements and Demarcations ; Management of State Forests ; Indigenous and Exotic Trees, with remarks on their interplanting ; Exploitation and Administration.

The fusion of the four large provinces, Cape, Transvaal, Orange Free State, and Natal, occurred during the year. This made it possible to place the whole of the State Forests under the control of one Department, thus facilitating economy of management.

An important step has been taken in the training of men to fill vacancies in the higher branches of the service. Hitherto such men were trained at considerable expense at the South African School of Forestry. It has now been decided, however, to draw them from the Oxford School of Forestry, preference being given to Rhodes Scholars. With this in view, arrangements are being discussed with the Rhodes Scholarships Trustees, whereby as the demand arises, a Rhodes Scholar, before proceeding to Oxford, may obtain a Government nomination which will entitle him to an appointment with a commencing salary of £200 per year on the satisfactory completion of his course of study. The work of the existing School of Forestry will in future be limited to giving elementary tuition in theory and science to men training for subordinate positions. A few of these men, however, who show special ability, may be admitted to the higher grade.

Exotic trees appear more popular than native trees for general planting. Various species of *Eucalyptus* are used in quantity as also are several species of Australian *Acacia*. *Acacia melanoxylon*, R. Br., is reported on very favourably and is said to be less liable to injury by fire than other trees. Of the various cypresses, *Cupressus arizonica*, Greene, has given the most satisfactory results and has grown well under peculiarly trying conditions in the Orange Free State and Transvaal. Numerous pines including *Pinus Pinaster*, Soland. ; *P. insignis*, Dougl. ; *P. patula*, Sch. & D. ; *P. Montezumae*, Lamb. ; *P. canariensis*, C. Sm. ; and *P. halepensis*, Mill., are reported upon favourably, although in some districts liable to disease. As is usually the case elsewhere, *P. insignis* grows remarkably fast and forms timber at a rapid rate.

In the Report, allusions are made to trials of various rubber-producing trees in Natal and to the turning of sand dunes into forest land with the aid of town refuse in the neighbourhoods of Port Elizabeth and Cape Town.

W. D.

**Forest Flora of Bombay.\*** Mr. W. A. Talbot, until recently Conservator of Forests, to whose enthusiasm we owe much of our knowledge of the Flora of N. Kanara, has just completed his

\* Forest Flora of Bombay Presidency and Sind, by W. A. Talbot, F.L.S. Conservator of Forests. 2 vols., 4to, pp. 508 and 574.

Forest Flora of the Bombay Presidency and Sind—a work which, as the author explains, is to be regarded as a more complete edition of his *Trees, Shrubs and Woody Climbers of the Bombay Presidency*.

From the valuable notes in the Introduction on the distribution of the Forest Flora within the district and throughout the book from the clear descriptions, economic notes, &c. the work should prove very valuable to Forestry officers since it embodies the experiences of one who has spent much time in the study of the woody plants of his area. A very brief perusal of the book suffices to convince one of the author's thorough knowledge of his district.

From the systematic botanists' point of view on the other hand the work is of somewhat less value. In the main the author has followed the recently completed flora for the same district by the late Dr. Cooke. One cannot, however, but come to the conclusion that such a handsome work would have been greatly improved had the author elected to follow the same course as the writers of the chief floras of India and elaborate his notes by work in a herbarium where authentic material could be consulted. As an example of the type of mistake which might then have been avoided *Chone-morpha macrophylla* may be cited. The Bombay plant is referred to this species—and here the author is but following earlier authorities—but the probability seems to be that the Bombay plant is distinct from both the Sikkim and the Sylhet one and that there are other imperfectly known species of the same genus in Burma. And again from the systematists' point of view it is to be regretted that no specimens are quoted under the species.

It must of course be borne in mind that Mr. Talbot was catering not for the systematic botanist but for the forestry officer. Still it is a matter of regret that Mr. Talbot has not been able to meet the requirements of both classes in a book conceived on so large a scale.

Both volumes are copiously illustrated, and although the type of illustration chosen may leave much to be desired the plates will no doubt afford the amateur some help in identification. Indices to the Native and English names as well as to the scientific names accompany each volume.

The work throughout is well printed and might with advantage be taken as a model by several of the other Government Printing establishments in India.

W. G. C.

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**Introduction of Citrus by means of bud-wood.**—In the Report of the Botanic Station, Dominica, for the year 1910–1911, recently published, an account is given on p. 3 of the work which is being done in the introduction of new varieties of *Citrus* into the Island.

It has been found by experience that budded plants of *Citrus* varieties fail to do well when introduced owing apparently to the fact that the stocks on which they have been budded are unsuitable to the local conditions.

The Curator of the Dominica Station has, therefore, been making experiments in budding *Citrus* on the local sour orange as a stock with conspicuous success.



Bud-wood of the Bahama grape fruit was obtained from the Nassau Botanic Station. The carefully-packed shoots, though they were over six weeks in transit, were successfully worked on the sour orange stocks in Dominica and 26 per cent. of the buds inserted grew.

Bud-wood has also been imported from Florida and Palestine.

The result is of considerable importance, as it used to be thought impossible to send bud-wood over long distances, and in order to introduce a new species or variety it was always considered necessary to obtain plants from Europe or America.

The Dominica experiments have proved that the introduction of plants has frequently led to failure, but that by means of bud-wood varieties may be introduced, and are now flourishing, which formerly had always been a failure. Further, that it is easier and cheaper to import bud-wood of standard varieties than to introduce budded plants.

It is of course essential that the nurseries should contain a good supply of healthy local stock on which to work the buds immediately after their arrival.

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Shade and Mulch for Cacao.—In *Kew Bulletin*, No. 4, 1912, p. 177, reference was made to the cultivation of Cacao on Lord Glenconner's Ortinola Estate, Trinidad, and to the good effects of the liberal mulching there practised.

Numerous trees were being used experimentally for the combined purposes of giving partial shade and yielding material for mulch such as *Erythinas*, *Albizzias*, *Pithecolobium saman* and *Gliricidia maculata*. One tree which appeared to be particularly useful proves to be *Cassia grandis*, Linn. f., from specimens sent to Kew by Mr. W. Bain.

This tree can easily be climbed owing to its smooth stem, and yields a plentiful supply of leafy branches for use as mulch.

Mr. Bain, in his letter accompanying the specimens, writes on 12th May: "We have had an almost continual spell of dry weather since you left Trinidad [Feb. 6, 1912], and have had only about 21 inches of rain during the past eight months; we often get this rainfall in six or eight weeks. This weather is having a disastrous effect on the cocoa estates generally throughout the island. We have lost lots of the young fruit on the estate from want of sufficient moisture, but the pruning and mulching system here helps the trees to resist the effects of dry weather. So far we have got few dead trees compared to some plantations in the district."

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